

INCREMENTAL AND ABSOLUTE TRANSDUCERS 2018



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PRODUCTION



FOR MORE THAN 30 YEARS WE'VE BEEN FOCUSED ON DEVELOPING AND MANUFACTURING ALWAYS MORE INNOVATIVE ENCODERS. THAT'S WHY WE'RE A LEADING COMPANY, SINCE 1985.

The **2015** represented a very significant date for our Company: in fact we celebrated **30 years of activity** in the sensor market of the factory automation.

More than 30 years of success and accomplishments, started from what at the beginning seemed only a dream but, thanks to the constant efforts and an entrepreneurial vision, has rapidly turned into a solid business project, which counts today with a world-wide presence, a sales network that covers all the

continents, business partners and branches situated in the most important International markets, and an extensive catalog that offers **over 5.000 products** in line with the latest technologies.

More than 30 years of growth and innovation, thanks to the continuous investments in the Research and Development of new prototypes and new solutions for our Customers and, above all, thanks to the know-how and the expertise of the people that form our Company, the

real patrimony of Eltra, who have allowed us to keep on growing and improving day after day.

More than 30 years in which we've been focused on one goal: developing and manufacturing state-of-the-art transducers for motion control technologies, designed to meet the Client's needs in terms of efficiency and quality as well as of costs, while maintaining the flexible design and the customized assembling approach that distinguish Eltra's brand **since 1985**.



QUALITY

SOLUTIONS FOR MOTION CONTROL IN INDUSTRIAL AUTOMATED SYSTEMS



The **CE** marking (also known as CE mark) is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA).

ATEX gets its name from the French title of the 94/9/EC directive: Appareils destinés à être utilisés en ATmosphères EXplosibles. Employers must classify areas where hazardous explosive atmospheres may occur into zones. The classification given to a particular zone, and its size and location, depends on the likelihood of an explosive atmosphere occurring and its persistence if it does.

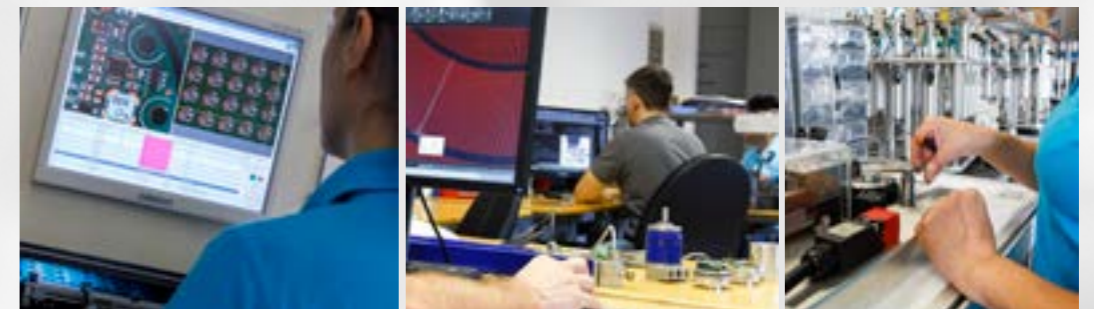
ISO 9000 is a family of standards for quality management systems. ISO 9000 is maintained by ISO, the International Organization for Standardization and is administered by accreditation and certification bodies. Some of the requirements in ISO 9001 (which is one of the standards in the ISO 9000 family)

REACH (Registration, Evaluation, Authorisation and restriction of CHemicals) is a new European Union Regulation, EC/2006/1907 of 18 December 2006. REACH addresses the production and use of chemical substances, and their potential impacts on both human health and the environment.

Underwriters Laboratories Inc. (**UL**) is a U.S. privately owned and operated, independent, third party product safety testing and certification organization. A manufacturer of a UL-certified product must demonstrate compliance with the appropriate safety requirements, many of which are developed by UL.



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APPLICATION

SOLUTIONS FOR MOTION CONTROL IN INDUSTRIAL AUTOMATED SYSTEMS

Reliability, speed and endurance are common and key factors for an efficient operation of systems and robots among the broad field of the Factory Automation. These features play a central role also in the electro-mechanical components of the machines applied in the motion control technology.

Eltra has an extensive catalog of encoders with a high level of resolution and IP rating, that satisfy the needs of this macro-area of application in terms of electronics – with several interfaces and output frequencies available – and

mechanics – with a large number of flanges and diameters options – in order to offer a wide spectrum of standard products. Moreover, for all those production plants and systems that have specific requirements, Eltra offers custom-tailored solutions designed to meet the Client's needs.

MOTION CONTROL

Series with a high IP sealing, extremely adaptable and easy to fix, particularly suitable for motion control application.

ROBOTICS

Encoders featuring high resolution and output frequency to ensure the maximum accuracy of automated systems and industrial robots.

SERVO-MANIPULATORS

Especially compact devices that guarantee a fully reliable position and speed control in servo-manipulators.



TECHNICAL BASICS



WHAT IS AN ENCODER ?

The encoder is a transducer of position and speed which converts the angular or linear motion of a shaft (or axle) into a series of electrical digital pulses.

These electrical pulses are employed to control the motion of the mechanical shaft (that has generated them).

The encoder is composed by:

- **Mechanical interface**
- **Code wheel (or magnetic actuator or linear scale)**
- **Optoelectronic receiver (or magnetic sensor)**
- **Electrical interface**

Main technologies used in encoders to detect the signals are:

- **Photoelectrical or optical scanning (rotary or linear)**
- **Magnetic field variations (rotary or linear)**
- **Potentiometer (rotary or linear)**
- **Magnetostrictive effect (linear)**
- **Energy Harvesting Effect (rotary)**

Main applications of rotary and linear transducers are: machine-tools, material processing machinery, robots, motor feedback systems, measure and motion control devices.

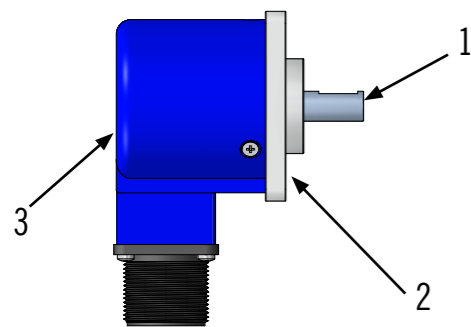
MECHANICAL INTERFACE

The mechanical interface consists in all those components that allow the coupling of the encoder to the machine or device of application, which are:

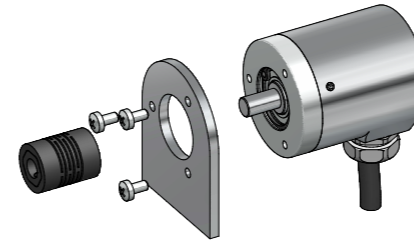
1. An **axle**, connected to the shaft of the machine in rotation, designed in accordance to the type of fixing: **solid** or **blind/through hollow shaft**;
2. A **flange**, which fixes and adjusts the encoder to its support;

3. An **housing (or body)**, which contains and protects the disc and the electronic components.

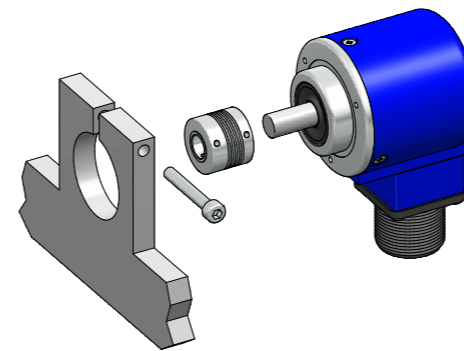
Elastic couplings can also be used to adapt the fixing between the motor shaft and the encoder.



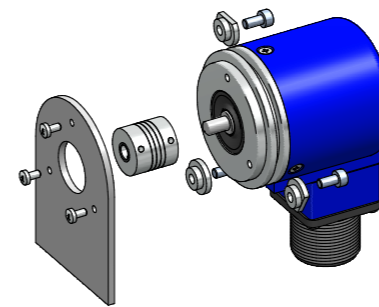
Some examples of encoders' mounting



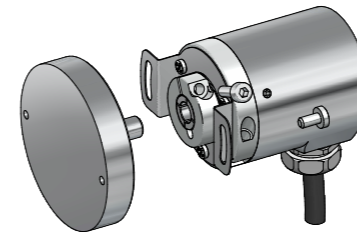
Solid shaft rotary encoder mounted by a fixing flange and the elastic coupling.



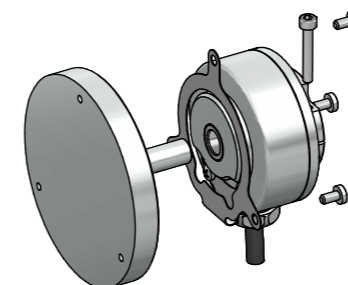
Solid shaft rotary encoder mounted by a clamping fixing.



Solid shaft rotary encoder mounted by a fixing flange (or by fixing clamps) and the elastic coupling.



Blind hollow shaft rotary encoder mounted by a stator coupling with collar clamping shaft fixing.



Through hollow shaft encoder with a rear collar clamping shaft fixing.

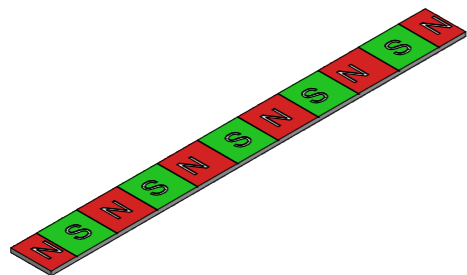
ENCODER CODE WHEEL (OR MAGNETIC / LINEAR SCALE)

The encoder code wheel (or disc) defines the transmission code of pulses; it is formed by a support made of plastic, glass or metallic material, on which is engraved a pattern of alternated clear (transparent) and opaque segments.

On linear scales this pattern is replaced by a stationary opaque strip. With magnetic sensing codewheel or linear scale is substituted by a magnetic (north / south) pattern.



Example of codewheel

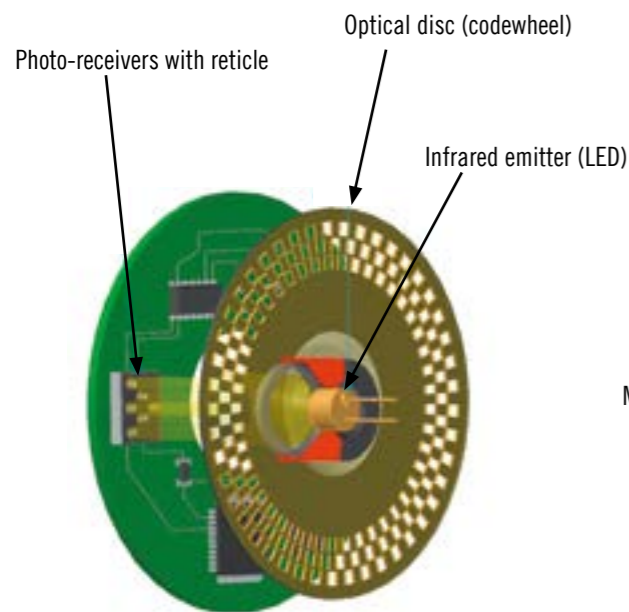


Example of magnetic linear tape

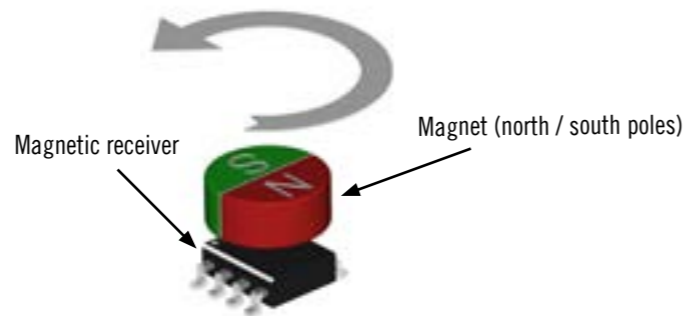
ENCODER OPTOELECTRONIC RECEIVER (OR MAGNETIC SENSOR)

The optoelectronic receiver is made by an array of sensor (photodiodes or phototransistors) which is illuminated by an infrared light source (IR LED). Between the receiver and the LED there's the graduated codewheel. The light projects the disk image on the receiver's surface which is covered by a grating called reticle having the same disk steps. The receivers transduce

the occurring light variations caused by the disk shifting and convert them into their corresponding electrical variations. In magnetic encoders system is made by a rotating actuator with a magnet and the magnetic sensor convert magnetic field variation into electrical signals.



Example of optoelectronic sensor



Example of magnetic sensor

Electrical interface

The electrical interface is the way the encoder communicates data to a receiver. Electrical signals (can be digital or analogue) are transmitted through the encoder cable to an intelligent device such as interface board, PLC, etc. Electronics interface depends on the encoder type, incremental or absolute.

interfaces on absolute encoders are:

- Analogue (voltage or current)
- Bit parallel (NPN / NPN Open collector / PNP / PNP Open collector / Push pull)
- Serial transmission (Serial Synchronous Interface SSI)
- Fieldbus (Profibus or Profinet)

Interfaces on incremental encoders are:

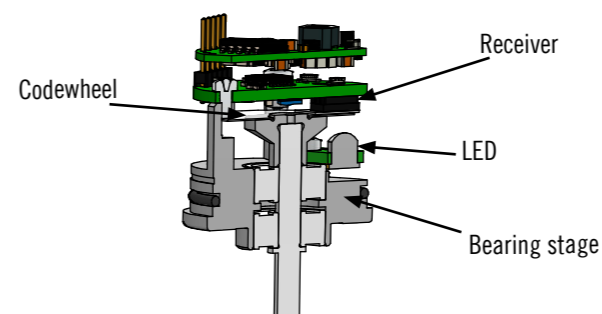
- NPN
- NPN Open collector
- Push pull
- Line driver

PHOTOELECTRIC OR OPTICAL SCANNING (ROTARY OR LINEAR)

There are two ways on optical scanning to build an optical system: transmissive or reflective.

The disc beams its image on the surface of several receivers, opportunely masked by another grid (called "reticle") with the same pitch as the other. The receivers have the task to sense the variations of light that take place during the rotation of the disc, converting them into corresponding electric pulses. In linear transducers the operating principle is similar, with the difference that the motion is detected on a linear reading system.

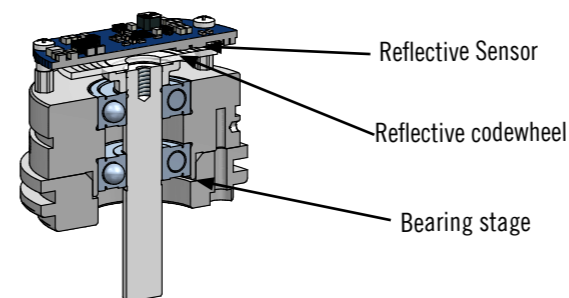
In the transmissive optical encoder, the scan system is based on the rotation of a graduated disc - or code wheel - patterned with alternating opaque and clear (transparent) segments; the code wheel is illuminated by an infrared light source positioned perpendicularly to the sensor.



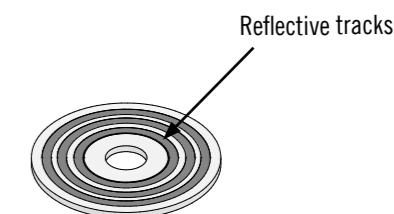
Example of transmissive encoder

The reflective optical system is also based on the photoelectric scanning of a code wheel, but in this type of technology the light source and the receiver are in the same surface mount package: the light source illuminates the code wheel formed by darker segments alternated with reflective ones, where the light is reflected and detected by the sensor (receiver), which will

transform the variations in corresponding pulses, as per the transmissive system. This type of reading allows reducing the size of the device while maintaining its performances; it's an ideal solution for those applications that require miniaturized encoders with a high resolution.



Example of reflective encoder



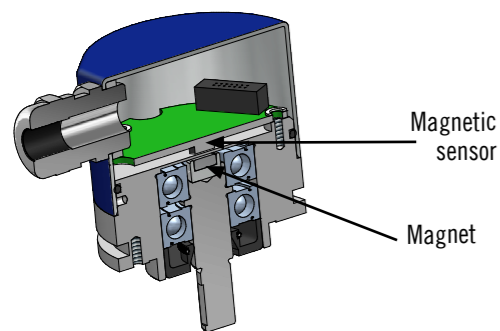
Example of reflective codewheel

MAGNETIC SENSING (ROTARY OR LINEAR)

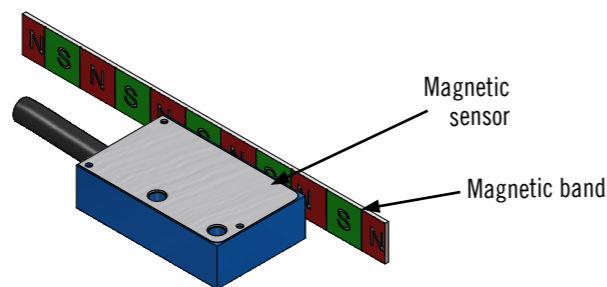
Magnetic encoders employ a signal detection system based on the variation of the magnetic flux generated by a magnet (one or more pole pairs) placed in rotation in front of a sensor, usually fixed to the encoder's shaft. The variation of the magnetic field is sampled by the sensor and converted into an electric pulse, which determines the position; the magnetic technology could be of two types: on axis or off axis.

The main benefit of the magnetic technology is the absence of contact in the detection system, which helps preventing the wear and it's therefore quite convenient in terms of cost, since it doesn't require maintenance and has a potentially infinite durability.

Magnetic encoders are particularly suitable for heavy duty applications that require high robustness, speed and a wide range of operating temperature, while ensuring, at the same time, an excellent reliability in the generation of signals.



Magnetic rotary encoder



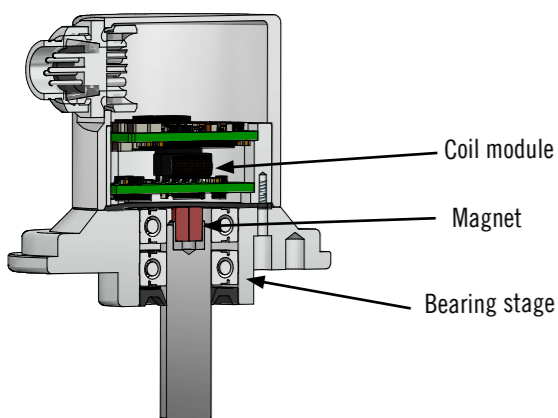
Magnetic incremental linear encoder

ENERGY HARVESTING (ROTARY)

On the multiturn side, the multiturn counting is enabled utilizing energy-harvesting technology.

When the shaft is rotating, the magnet mounted on the shaft moves in tandem. The energy-harvesting coil module cuts the moving magnet field, and generates energy as a result. The beauty of the energy-

harvesting effect is that the same amount of energy is generated independently of the rotation speed. The generated energy is sufficient to power up the revolution tracking circuitry. Therefore, no miscounts occur even in the absence of external power supply. It can replace traditional gear technology due to absence of wear (no contact technology).



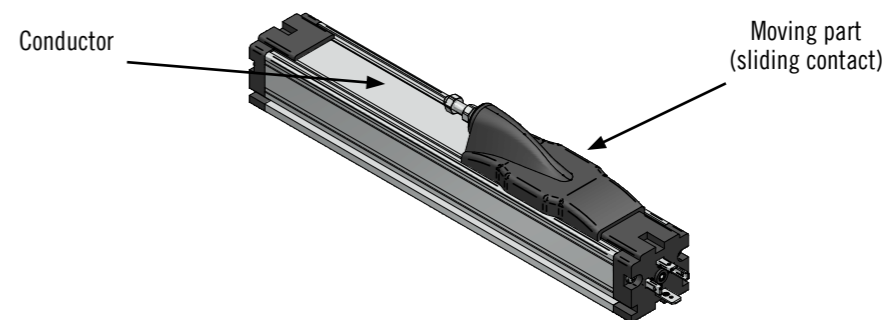
Energy Harvesting engine

POTENTIOMETRIC SENSING (ROTARY OR LINEAR)

This type of linear / rotary transducer is formed by a wire or a metal layer, wound up in a non-conductor support, and by a movable contact that shifts along the conductor.

The operating principle is based on the change in resistance of an electric circuit, caused by the displacement of the object of which the position must be determined.

Potentiometers are particularly suitable for the employment in thermo-plastic, wood, marble, iron and steel processing machinery and for any application that requires position and motion absolute measurement.



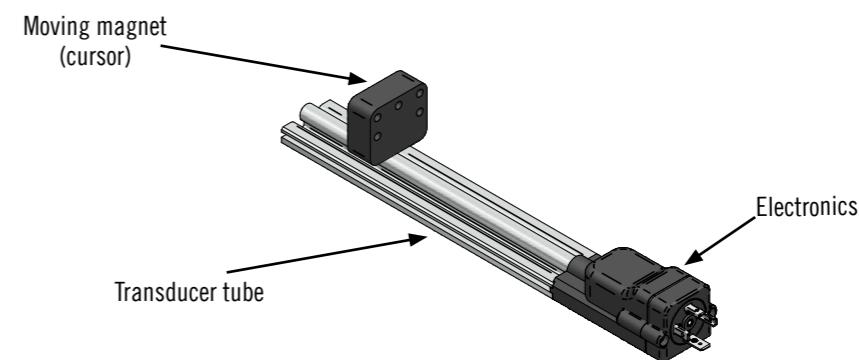
MAGNETOSTRICTIVE SENSING (LINEAR)

Magnetostrictive transducers are based on the magnetostriction principle for which certain materials expand and contract when they are put into an alternate magnetic field.

Those two magnetic fields are generated from the moving magnet and from the current pulse inside the tube of the transducer. This interaction creates a strain pulse which travels inside the tube until it is detected by the electronics.

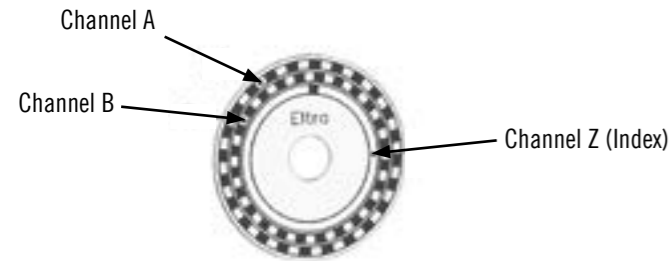
The absolute position is calculated by measure the time of the strain pulse compared to the current pulse who generate it.

The key factor of this technology is the absence of any electric contact on the slider, which makes the device highly resistant to wear and tear while ensuring great performances in speed and precision.

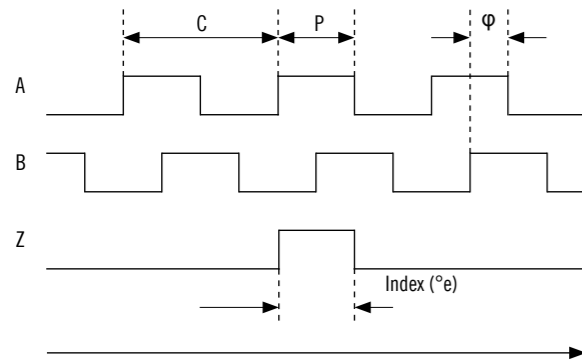


The incremental encoder is so defined since it tracks the increase (variation) in relation to a position taken as a reference point, independently from the direction of rotation. The incremental encoder senses rotation, speed and acceleration by counting the number of pulses sent by the output circuit, although the zero point of the machine must be reset at every new start.

The incremental encoder usually provides two types of squared waves, out-of-phase of 90° electrical degrees, which are usually called channel A and B. Channel A gives information only about the rotation speed (number of pulses in a certain unit of time), while channel B provides data regarding the direction of rotation, according to the sequence produced by the two signals. The resolution can be multiply by two or four reading non only rising edges but also falling edges of A and B signals. With this method, for example, an encoder with physically 1000 pulses per revolutions can generate 2000 or 4000 pulses per revolution. Another signal, called Zero (Z or Index) channel, is also available; it gives the absolute "zero" position of the encoder shaft and is used as a reference point.



Example of 3 channels incremental encoder codewheel



A leads B clockwise rotation (shaft view)



Incremental encoder output signals

One Cycle: 360 electrical degrees (°e).

Cycle Error (ΔC): an indication of cycle uniformity. The difference between an observed shaft angle which gives rise to one electrical cycle, and the nominal angular increment of 1/N of a revolution.

Pulse Width (P): the number of electrical degrees that an output is high during 1 cycle. This value is nominally 50 % (or 180°e).

Pulse Width Error (ΔP): the deviation, in electrical degrees, of the pulse width from its ideal value. Typical value is max ± 10 % on optical encoders or ± 20 % on magnetic encoders.

Phase (φ): the numbers of electrical degrees between the center of the high state of the channel A and the center of the high state of the channel B.

This value is nominally 90°e for a quadrature output.

Phase Error (Δφ): the deviation of the phase from its ideal value. Typical value is max ± 30°e on optical encoders or ± 40°e on magnetic encoders.

Index length (°e): Index is aligned on the channel A and its length can be 180 °e or 90 °e (called A&B)

Number of encoder pulses is determined from angular or linear resolution needed. For linear applications a calculation is required to convert linear movements into rotary.

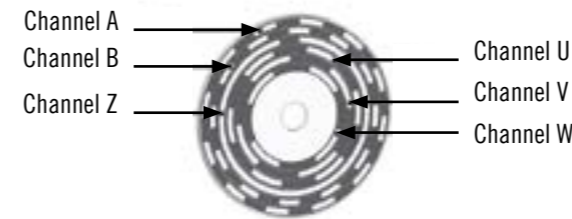
$$\text{Encoder Resolution (ppr)} = \frac{\text{Circumference}}{\text{Accuracy}}$$

Encoder max pulse frequency can be considered according to the speed and the encoder resolution.

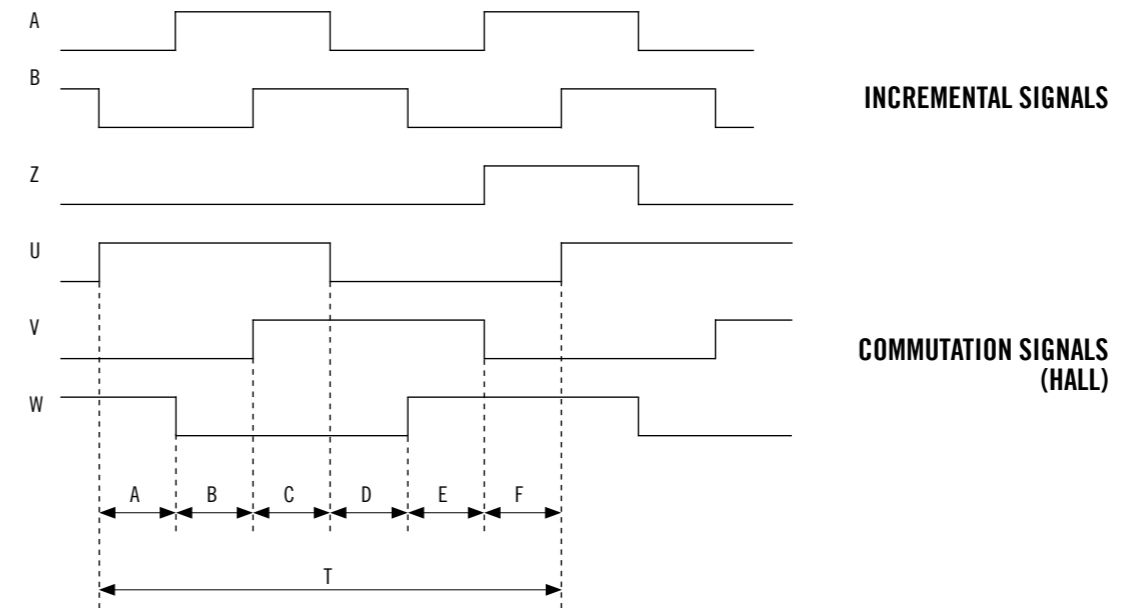
$$\text{Frequency} = \frac{\text{rpm} \times \text{resolution (ppr)}}{60}$$

There are other encoders that integrate additional electrical output signals called incremental encoders with integrated commutation signals, normally used as motor feedback. These additional signals (called U, V, W) simulate the commutation (Hall) signals, which are usually employed in brushless motors and are usually generated by integrated magnetic sensors.

In Eltra's encoders commutation signals are optically generated and are represented as 3 squared waves, shifted by 120° electrical degrees (see below table about the relation between motor poles and pulse degrees). These signals are used by the drive to generate the correct motor supply phases sequences. These commutation signals can be repeated many times within one mechanical revolution, since they depend directly on the number of poles of the motor.



Example of 6 channels commutation encoder codewheel



INCREMENTAL SIGNALS

COMMUTATION SIGNALS (HALL)

A leads B clockwise rotation (shaft view)

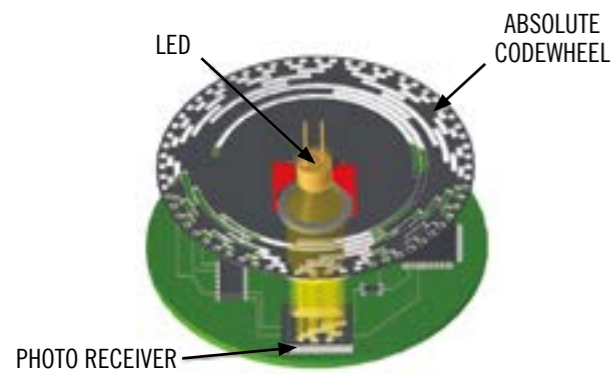


MOTOR POLES	A / B / C / D / E / F	T
4	30° ± 1,5°	180°
6	20° ± 1,5°	120°
8	15° ± 1,5°	90°

The absolute encoder provides a unique digital code for each angle position of the shaft, storing the value of the current position and, therefore, preventing the loss of the information in case of restarting the system or of a power-loss.

The absolute encoder could be of two types:

- Singleturn
- Multiturn



The singleturn absolute encoder allows a precise encoding of the angular position of the shaft, to which the encoder is coupled to, even if the power goes off. Therefore, each single degree position is converted into a specific code (Gray or binary) proportionally to the number of bit.

The multiturn absolute encoder allows a higher number of applications, representing a very interesting extension of the encoders' action field. Besides the angular tracking of the singleturn system, the multiturn stores also the counting of number of revolutions made.

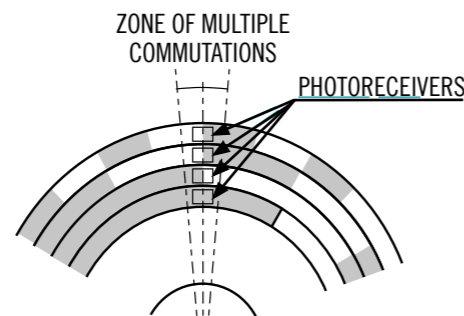
GRAY OR BINARY CODE

Absolute encoders are so defined since they maintain the absolute position value also after an interruption or a power-loss, so it's essential that all data referring to the position should be always available. For this purpose binary codes are employed, set by the pattern of clear and opaque segments placed crosswise or lengthwise on the disc, in relation to the direction of the movement.

BINARY CODE

The natural binary code presents the disadvantage to have more binary digits changing between two consecutive positions. Because of mechanical tolerances, bounces or noise, it could happen that the commutation signals do not switch all at the same time when the state changes, causing intermediate situations that could produce errors in the calculation of the position.

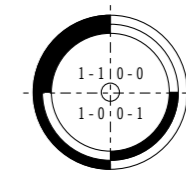
To avoid this inconvenient and, therefore, to avoid errors in the output code, an output sync signal (STROBE) is used.



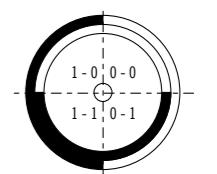
GRAY CODE

In Gray code a single binary digit changes between consecutive steps; the code tracks are read crosswise, with respect to the direction of movement, avoiding encoding errors caused by bit changing in contiguous positions.

DECIMAL	BINARY	GRAY
0	0000	0000
1	0001	0001
2	0010	0011
3	0011	0010
4	0100	0110
5	0101	0111
6	0110	0101
7	0111	0100
8	1000	1100
9	1001	1101
10	1010	1111
11	1011	1110
12	1100	1010
13	1101	1011
14	1110	1001
15	1111	1000



2 Bit optical disc with binary code



2 Bit optical disc with gray code

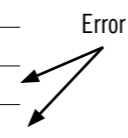
Gray code can be converted to binary with a simple combinatory circuit (XOR).

THE GRAY EXCESS CODE

However, when the number of defined position is not a power of 2, even with the Gray code more than one bit can change simultaneously between the last and the first code value.

For example in a 12 ppr absolute encoder, the code should be as the one shown in the table below. It is clear that between the positions "11" and "0" 3 bit simultaneous change may involve into reading errors.

POSITION	GRAY
0	0000
1	0001
2	0011
3	0010
4	0110
5	0111
6	0101
7	0100
8	1100
9	1101
10	1111
11	1110
0	0000



The Gray excess code is used to maintain the typical one-bit variation specificity by making the 0 position corresponding to the N value. The N is a number that subtracted from the Gray code converted into binary provides the exact position value.

The formula to calculate the N value is:

$$N = (2^n - IMP) / 2$$

Where : IMP is the number of PPR
2 is the power of 2 multiple immediately higher than IMP

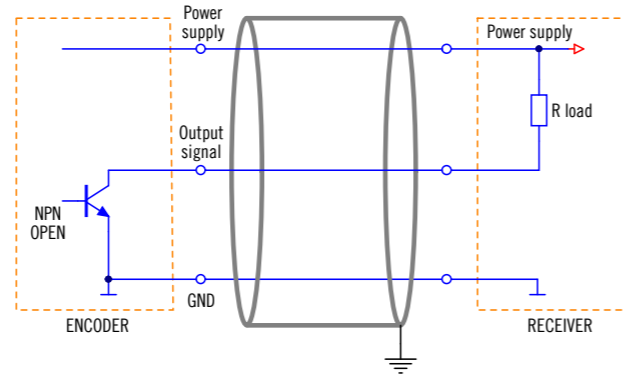
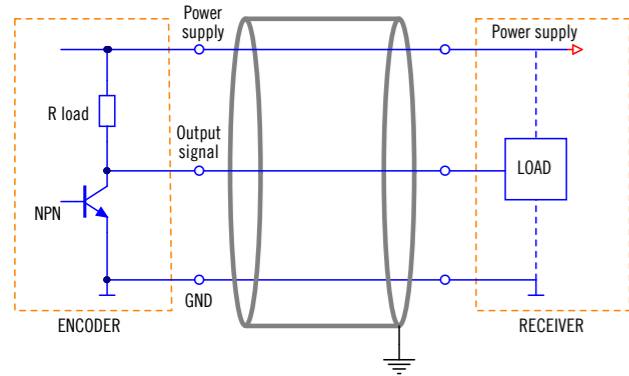
In our example N will be:

$$N = (2^4 - 12) / 2 = (16-12) / 2 = 2$$

NPN / NPN OPEN COLLECTOR

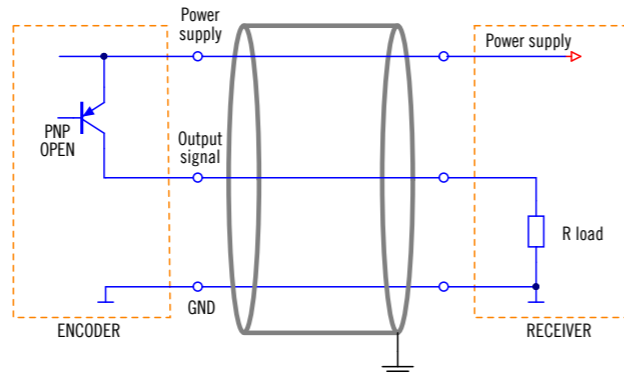
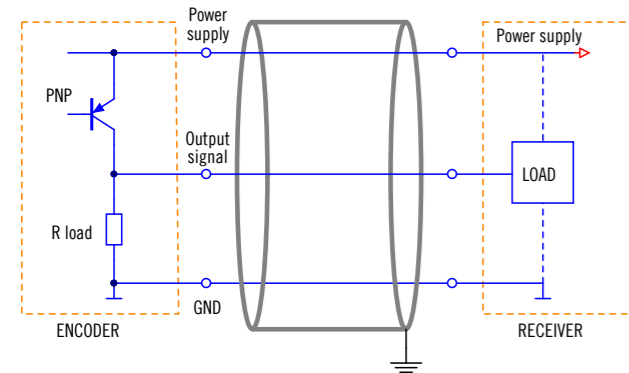
It is composed by an NPN transistor and a pull-up resistor used to match the output voltage to the power supply when the transistor is off (also called "sink output"). Output performances are limited by cable length,

signals frequency and load. On the open collector variant there's no pull-up resistor so it is possible to have signals with different voltages.



PNP / PNP OPEN COLLECTOR

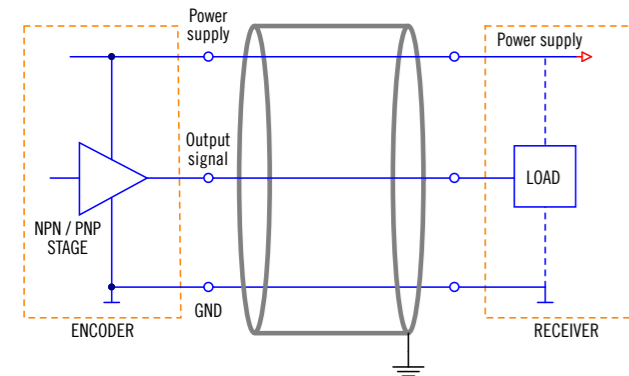
Main difference is the transistor, which is a PNP type (also called "source output"). The resistor, if present, is a pull-down one. It has same limitations as NPN in terms on cable length, frequency and load.



PUSH-PULL

In NPN or PNP frequency performances are limited by the resistor, which has a much higher impedance than a transistor. To overcome this issue, push-pull electronic uses a complementary transistor, so the impedance is lower for commutation to positive and to zero.

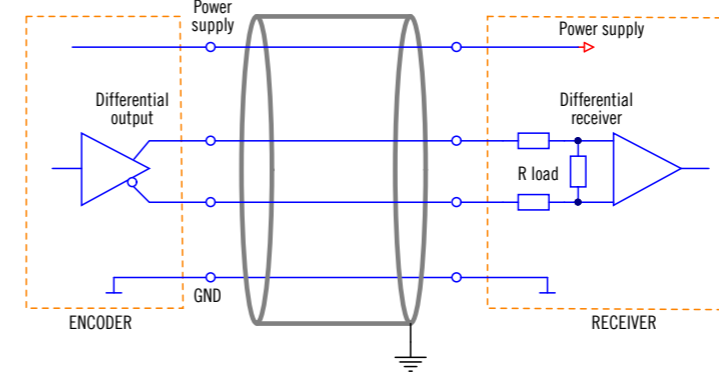
This solution increases frequency performances allowing longer cable connections and an optimal data transmission even at high working speed. Saturation signals are low but sometimes higher than in NPN and PNP electronics. PUSH-PULL electronics can be used indifferently instead of NPN or PNP.



LINE DRIVER

LINE DRIVER is used when operating environments are particularly exposed to electrical disturbances or when the encoder is quite far from the receiver system. Data transmitter and receiver work on two complementary channels so disturbances are limited (cross talk). These interferences are known as "common mode disturbances" as their generation is due to a common point which is 0 V.

Instead, in LINE DRIVER transmitted and received signals are in "differential way" so differences between complementary channels are used and common mode signal are eliminated by the receiver. This type of transmission is available both on +5 V DC (called RS-422) and +30 V DC models.



OUTPUT STAGE PROTECTION

A highly integrated ASIC is used to protect outputs from short circuits. This solution is based on an active sensor which controls instantly the temperature reached by the element to be protected.

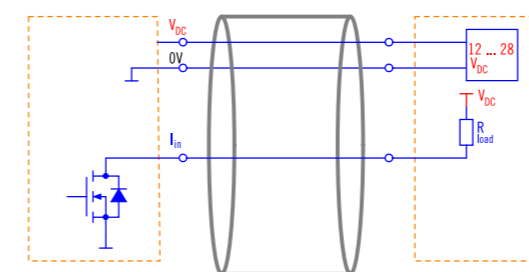
Moreover, it ensures a constant protection against repetitive and permanent short circuits, that is why it is strongly suggested for heavy duty applications or harsh environments. It is available for LINE-DRIVER and PUSH-PULL electronics.

ANALOGUE INTERFACE

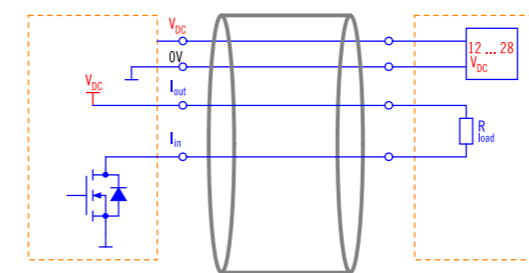
Analogue interface provides position by current or voltage signals. It can be used as potentiometer replacement. Voltage range goes from 0 ... 5 V to 0 ... 10 V and current range goes from 0 ... 20 mA to 4 ... 20 mA according to industry standard interfaces.

Current output

4 wire sink

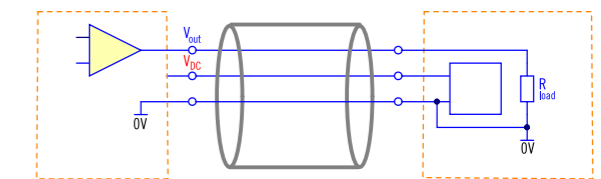


3 wire sink



$$\text{where } R_{LOAD} \text{ max} = (V_{DC} - 2) / 0.02$$

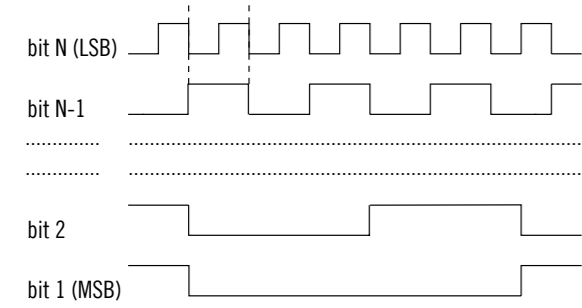
Voltage output



$$\text{where } R_{LOAD} \text{ min} = 1 \text{ k}\Omega$$

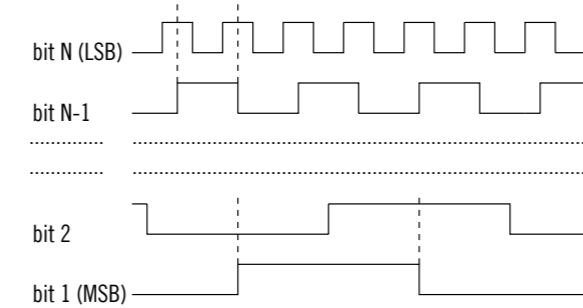
BIT PARALLEL INTERFACE

The parallel output is the standard interface for singleturn and multiturnd absolute encoders. These encoders provide the data output regarding the position in a “bit by bit” encoding (according to Gray or binary standards), according to the resolution of the device; parallel transmission requires indeed a wire for each bit, therefore for a higher resolution of the device



Binary bit parallel output

there will be a higher complexity of the wiring. To reduce the number of wires, other forms of data transmission like the SSI serial interface or field bus protocols (PROFIBUS or PROFINET) have been implemented.

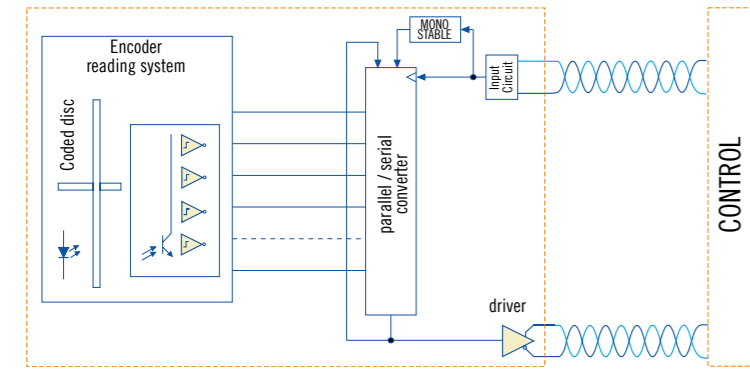


Gray bit parallel output

SSI INTERFACE

The continuous evolution of the automation field implies a growing request for precision in measurement devices and, therefore, also in absolute encoders. To satisfy this demand, absolute encoders have been designed with always higher resolution, which means an increasing number of bit and, as a consequence, also of wires.

The Synchronous Serial Interface (SSI) was created to solve these setbacks, in order to contain installation costs and simplify the wiring. This interface transmits data in a serial mode by using only two signals (CLOCK and DATA), independently from the number of bit of the encoder.

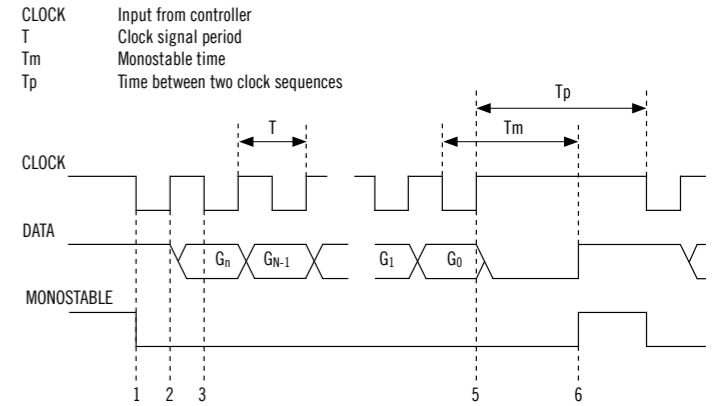


The position data is obtained by the encoder reading system and continuously transmitted to a parallel/serial converter (based by a “shift register” with parallel loading). When the mono-stable circuit is activated by a clock signal transition, the data is stored and transmitted to the output synchronized with the clock signal.

CLOCK and DATA signals are transmitted differentially (RS422) to enhance immunity from interference and to allow longer transmission distances.

When quiescent, CLOCK and DATA signals have a high logical level and the monostable circuit is disabled.

- On the first CLOCK falling edge the monostable is activated and parallel value at the P/S converter input is stored into the shift register.
- On the next CLOCK rising edge Most Significant Bit (MSB) is transferred into the DATA signal output.
- On the next CLOCK falling edge (when the signal is stable) the controller acquires value from DATA signal and monostable is re-activated.
- On each further CLOCK rising edge following bit up to the least significant one are copied in the DATA signal output and then acquired by the controller on falling edge.
- At the end of the CLOCK pulse sequence, when the external control has also acquired the value of the Least Significant Bit (LSB), the CLOCK pulse sequence stops and therefore the monostable is no longer re-activated.
- Once the mono-stable time (T_m) has passed, the DATA signal returns to a high logical level and monostable disables itself.



The frame length of the transmitted data depends only on the encoder type (singleturn or multiturnd) and not on the resolution. In fact, the standard frame length for a singleturn encoder is 13 bit, while for a multiturnd one is 25 bit. With multiturnd encoder with number of revolutions > 4096 frame length is

$$n = \text{number of bit per revolution}$$

$$T = \text{number of bit for revolutions } T_c = \text{clock period}$$

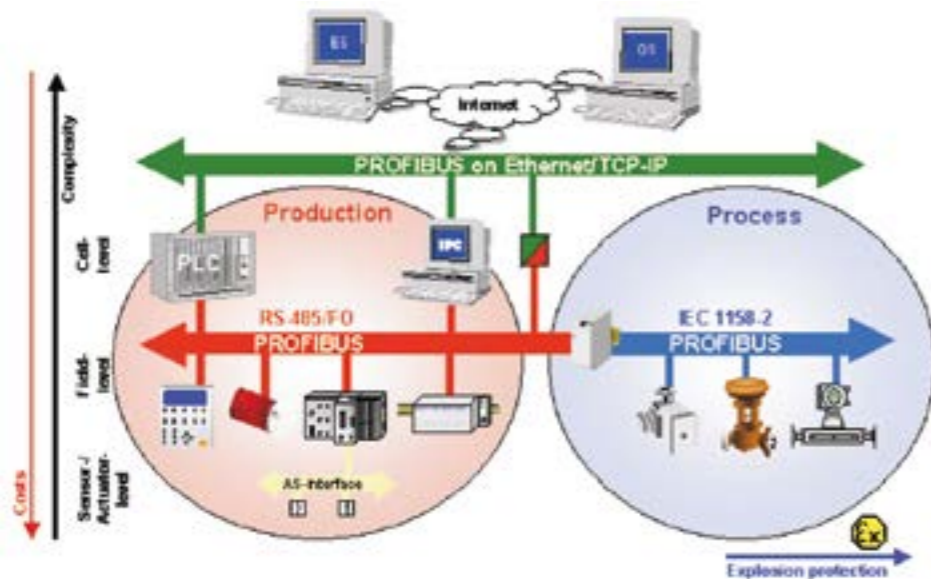
$$T_a = \frac{T_m - T_c}{2} \quad T_m = \text{monoflop time}$$

27 bit (14 bit for revolutions + 13 bit for singleturn) and 32 bit (19 bit for revolutions + 13 bit for singleturn). Frame alignment is on the center as shown on below table:

T	2 ^T			G _{n+11}	G _{n+10}	G _{n+9}	G _{n+8}	G _{n+7}	G _{n+6}	G _{n+5}	G _{n+4}	G _{n+3}	G _{n+2}	G _{n+1}	G _n	G _{n-1}	G _{n-2}	G _{n-3}	G _{n-4}	G _{n-5}	G _{n-6}	G _{n-7}	G _{n-8}	G _{n-9}	G _{n-10}	G _{n-11}	G _{n-12}	G _{n-13}	T _a	2 ⁿ	n							
12	4096	1	1																									0	1	8192	13							
11	2048	1	1	0																								0	0	1	4096	12						
10	1024	1	1	0	0																							0	0	0	1	2048	11					
9	512	1	1	0	0	0																						0	0	0	0	1	1024	10				
8	256	1	1	0	0	0	0																					0	0	0	0	0	1	512	9			
7	128	1	1	0	0	0	0	0																				0	0	0	0	0	0	1	256	8		
6	64	1	1	0	0	0	0	0	0																			0	0	0	0	0	0	0	1	128	7	
5	32	1	1	0	0	0	0	0	0	0																		0	0	0	0	0	0	0	0	1	64	6
4	16	1	1	0	0	0	0	0	0	0	0																	0	0	0	0	0	0	0	0	1	32	5
3	8	1	1	0	0	0	0	0	0	0	0	0																0	0	0	0	0	0	0	0	1	16	4
2	4	1	1	0	0	0	0	0	0	0	0	0	0															0	0	0	0	0	0	0	0	1	8	3
1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0													0	0	0	0	0	0	0	0	1	4	2

PROFIBUS (Process Field Bus) is a serial communications standard for devices connected to automation networks (field bus). It is an open protocol defined by the DIN 19245 that became European standard as EN 50170 volume 2. PROFIBUS is promoted by Siemens and is widely diffused all across Europe. Thanks to the definition of three different communication profiles (DP, FMS and PA), this field bus is suitable for many requirements in automation system. Starting with applications requiring a high cyclical exchange speed of

a reduced number of bit (PROFIBUS DP), up to the management of complex communications between “intelligent” devices (PROFIBUS FMS) or tasks strictly related to automation process (PROFIBUS PA). Hereinafter the attention will be focused on the DP version (decentralized periphery), which is the standard solution to manage devices by a bus. These devices usually are: I/O modules, sensors/transducers or actuators on a low level in automation systems.



NETWORK TOPOLOGY: It is a common bus structure (closed on both sides) where up to 126 devices can be connected at the same time. If the physical support is an RS485 interface, up to 32 nodes can be inserted without using signal repeaters/re-generators.
HARDWARE LEVEL: In addition to the RS485 differential serial technology transmission, an optical fiber connection can be used. In any event, DP and FMS devices can co-exist in the same network. They share the same hardware interface communication (they are the same levels 1 and 2 of the ISO/OSI stack). The established standard requires an extremely accurate communication speed between 9.6 kBaud (min) and 12 kBaud (max).
DEVICES PRESENT IN THE NETWORK: It is possible to divide the devices into three classes: class 1 Master DP (DPM1), class 2 Master DP (DPM2) and

Slave. The class 1 includes all the devices periodically exchanging information with distributed peripheral (they can directly manage the I/O network data with the other nodes, mainly slaves). The class 2 masters are designated to configure and to monitor network status and devices connected to it. Slaves have the task of directly exchanging information with the external word in both directions (in and out). Typical examples of slaves are: digital I/O, encoders, drivers, valves, different types of transducers, etc.
BUS ACCESS METHODS: Two configurations are available in a bus with single or multi master operating ways: the ‘Token Passing’ one, for exchanging information about network management among possible available masters, and the well known ‘polling interrogation’ for the master-slave communication.

The main characteristics implemented in the PROFIBUS DP protocol are as follows:

- Periodic data exchange:** after the slave initialization step, every master is configured in order to exchange a maximum of 244 input bytes and 244 output bytes with every slave. The effective data exchange rate is based on the selected BaudRate, on the nodes present in the network and on the specific bus settings. Considering the maximum data exchange rate of 12 Mbaud, the PROFIBUS DP is one of the fastest field buses.
- Synchronization:** command controls are available (they are sent by the master in multicast). This gives the possibility to create a synchronous acquisitions through a slave, a group or all the slaves (Freeze Mode). Outputs sent to the slave have similar behavior. (Sync Mode). Parameterization and configuration security: After a preset period of time - if the communication between the master/s and the slave/s is not repeated - the system goes into a safe status.
- Diagnostic functions:** each slave can require to the master to be set up for reading its own diagnostic. In such way any possible problem occurring in the slave can be easily localized. The diagnostic can contain up to 244 bytes of information. Among them, the first six are mandatory for each DP slave.
- Dynamic slave management:** there is the possibility to activate or deactivate slaves present in the network. Moreover, it is possible to change by the bus slaves addresses that make possible this function.

- Easy network configuration:** main characteristics of each device present in the network are listed in the form of a GSD file complying to Profibus specifications. This simplify the set up and the configuration of the device by a graphic tools suitable for the purpose, such as the Siemens COM PROFIBUS software. As mentioned, the master-slave exchange data takes place periodically depending on the topology of the network and on the number of nodes present. However, before this step the slave has to be successfully parameterized and configured.
- Parameter setting:** the master sends to the slave a series of parameters necessary to specify its operation. The standard requires 7 bytes containing the mandatory information for the slave. Additional data can start from the eighth byte in the DU field (Data Unit, for more information see the Profibus DP) up to a maximum of 244 bytes for the communication frame.
- Configuration:** This step starts when the master has successfully set slave's parameters. During this step the master specifies the number and type of data, or better, the number of bytes to be exchanged with the slave both for incoming and outgoing information. This data is also present in the DU field of the communication frame: if the slave accepts the configuration, it can periodically exchange with the master.
- Periodic exchange:** The master specifies within the DU field frame the necessary information and the slave sends requested data within the reply frame. During periodic exchange, the slave may advise the master that a new diagnostic data is ready and then it asks to the master if it prefers reading this information in the next polling instead of the input data coming from the peripheral.

As already mentioned, the master-slave data exchange is periodic and essentially depends on the network topology and on the present node number. However, before starting the data exchange, it is necessary that slave parameter settings and slave configuration have been successfully completed. More details are as follows:
Parameter setting: during this step the master sends to the slave a series of operating parameters necessary for specifying its operation. The standard requires 7 bytes containing the mandatory information for the slave. Additional data can start from the eighth byte in the DU field (Data Unit, for more information see the Profibus DP) up to a maximum up to a maximum of 244 bytes.

Configuration: when the master successfully set slave parameters, the configuration process starts. Then, the master specifies the number and type of data represented from the incoming and outgoing bytes number which has to be exchanged with the slave. This data is also present in DU field; if the slave accepts the configurations, it will begin to periodically exchange data with the master.
Periodic exchange: the master specifies within the DU field frame the needed information and the slave will send requested data in the reply frame. During periodic data exchange the slave may advise the master that a new diagnostic data is ready and then it asks to the master if it prefers reading this information in the next polling instead of the input data coming from the peripheral.

NETWORK CONFIGURATION BETWEEN THE GDS FILES



The ever-shorter innovation cycles for new products makes the continuous evolution of automation technology necessary. The use of fieldbus technology has been a significant development in the past few years. It has made possible to migrate from centralized automation systems to decentralized ones. PROFIBUS, as the global market leader, has set the benchmark here for 25 years. In today's automation technology, Ethernet and information technology (IT) are increasingly calling the shots with established standards like TCP/IP and XML.

Integrating information technology into automation opens up significantly better communication options among automation systems, extensive configuration and diagnostic possibilities, and network-wide service functionality.

These functions have been integral components of PROFINET from the outset. PROFINET is the innovative open standard for Industrial Ethernet.

PROFINET satisfies all requirements of automation technology; whether the application involves production automation, process automation, or drives (with or without functional safety), PROFINET is the first choice across the board.

As a technology that is standard in the automotive industry, widely disseminated in machine building, and well-proven in the food and packaging and logistics industries, PROFINET has found its way into all application areas.

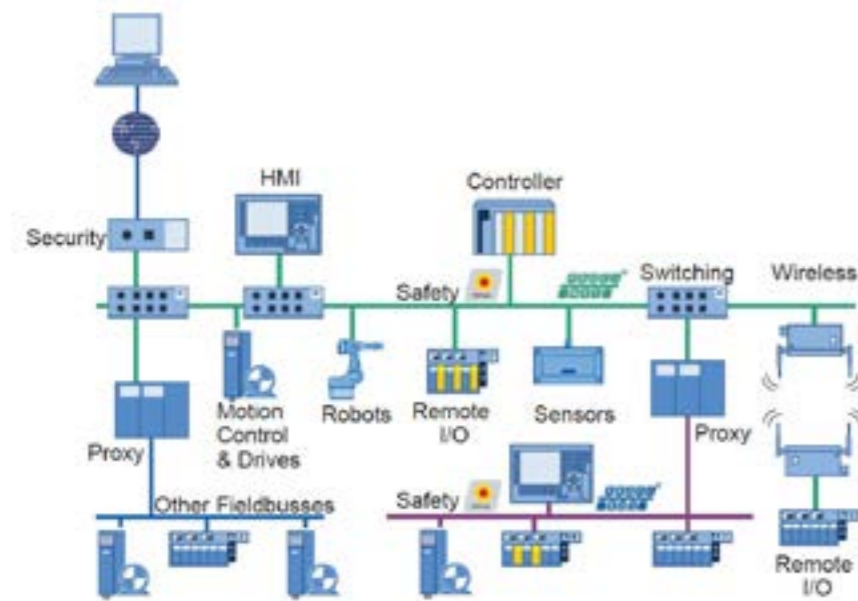
New application areas are constantly emerging, such as marine and rail applications or even day-to-day operations, for example, in a beverage shop. And now: the new PROFIenergy technology profile will improve the energy balance in production processes.

PROFINET is standardized in IEC 61158 and IEC 61784.

The ongoing further development of PROFINET offers users a long-term view for the implementation of their automation tasks.

For plant and machine manufacturers, the use of PROFINET minimizes the costs for installation, engineering, and commissioning.

For plant owners, PROFINET offers ease of plant expansion and high plant availability due to autonomously running plant units and low maintenance requirements. The mandatory certification for PROFINET devices also ensures a high quality standard.



Example of plant network

The scope of functions supported by PROFINET IO is clearly divided into conformance classes ("CC").

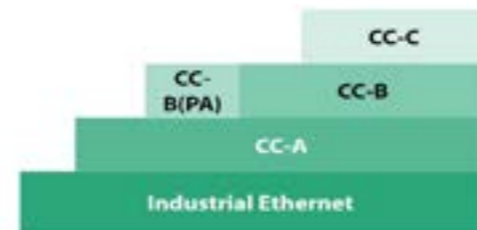
These provide a practical summary of the various minimum properties.

There are three conformance classes that build upon one another and are oriented to typical applications (see figure).

CC-A provides basic functions for PROFINET IO with RT communication. All IT services can be used without restriction. Typical applications are found, for example, in business automation. Wireless communication is specified for this class.

CC-B extends the concept to include network diagnostics via IT mechanisms as well as topology information. The system redundancy function important for process automation is contained in an extended version of CC-B named CC-B(PA).

CC-C describes the basic functions for devices with hardware-supported bandwidth reservation and synchronization (IRT communication) and is thus the basis for isochronous applications.



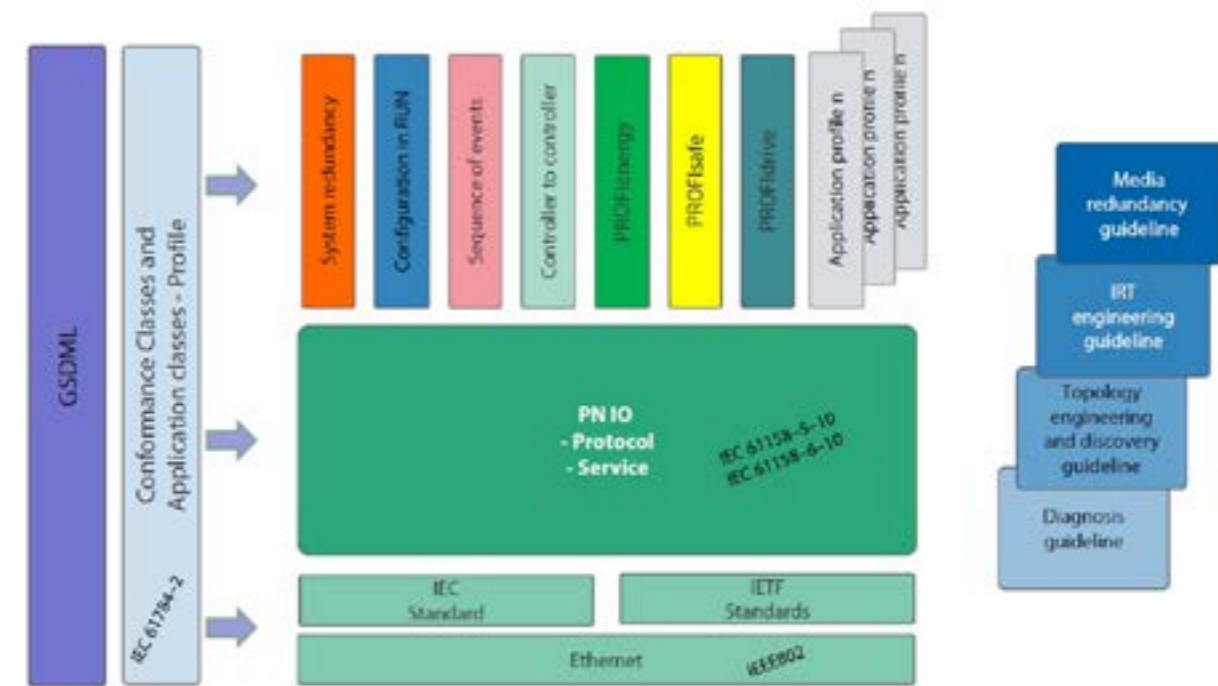
Structure of conformance classes

The conformance classes also serve as the basis for the certification and the cabling guidelines.

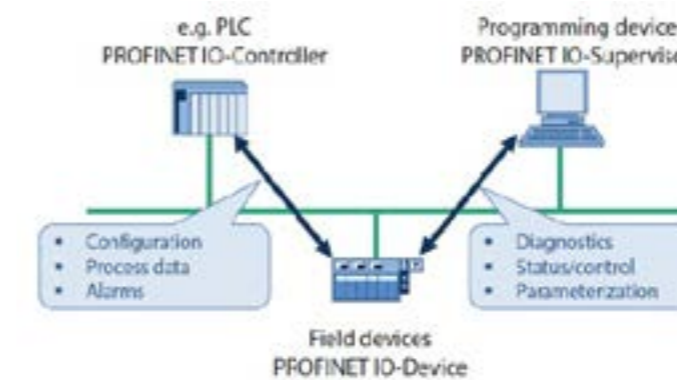
A detailed description of the CCs can be found in the document "The PROFINET IO Conformance Classes" [7.042].

The PROFINET concept was defined in close collaboration with end users based on standard Ethernet according to IEEE 802 in IEC 61158 and IEC 61784. Figure below lists additional specifications of the functionalities in the form of different joint profiles. These form the basis for device or

application-specific profiles. Instructions are created for the necessary planning, engineering, and commissioning steps. The basics for this form the guidelines for engineering PROFINET systems.



PROFINET IO follows the Provider/Consumer model for data exchange. Configuring a PROFINET IO system has the same look and feel as in PROFIBUS. The following device classes are defined for PROFINET IO (figure below):



IO Controller: this is typically the programmable logic controller (PLC) on which the automation program runs. This is comparable to a class 1 master in PROFIBUS. The IO controller provides output data to the configured IO devices in its role as provider and is the consumer of input data of IO devices.

IO Device: an IO device is a distributed I/O field device that is connected to one or more IO controllers via PROFINET IO. It is comparable to the function of a slave in PROFIBUS. The IO device is the provider of input data and the consumer of output data.

IO Supervisor: this can be a Programming Device (PD), personal computer (PC), or human machine interface (HMI) device for commissioning or diagnostic purposes and corresponds to a class 2 master in PROFIBUS.

A plant unit contains at least one IO controller and one or more IO devices. IO supervisors are usually integrated only temporarily for commissioning or troubleshooting purposes.

According to specific electrical interface please consider output levels per table below

LEVELS							
Output circuit	NPN	NPN Open collector	PNP	PNP Open collector	Push-pull	Line driver HTL	RS422
Ordering code	N	C	R	U	P / PC	L	S / RS
Load current	20 mA	20 mA	20 mA	20 mA	20 mA	20 mA	/
Signal levels							
HIGH (min)	+V DC - 2,5 V	/	+V DC - 2,5 V	/	+V DC - 2,5 V	+V DC - 2,5 V	2,5 V
LOW (max)	0,5 V	0,5 V	0,5 V	0,5 V	0,5 V	0,5 V	0,5 V
Note		Ext. power supply max +30 V DC		Ext. power supply max +30 V DC			
Reverse polarity power supply protection	see product datasheet						
Short circuit proof outputs	see product datasheet						

ENCODER CABLE LENGTH

Based on the power supply, electrical interface and output frequency maximum cable length are as below tables:

INCREMENTAL ENCODERS			
Power supply (+ V DC)	Electrical interface	Frequency (kHz)	Max cable length (m)
5V	RS-422	50	300
5V	RS-422	100	200
5/30V - 5/28V - 8/24V	Line driver HTL	50	80
5/30V - 5/28V - 8/24V	Line driver HTL	100	40
5/30V - 5/28V - 8/24V	Push-pull	50	60
5/30V - 5/28V - 8/24V	Push-pull	100	30

ABSOLUTE ENCODERS			
Power supply (+ V DC)	Electrical interface	Frequency (kHz)	Max cable length (m)
8/28V - 8/30V	Push pull Bit parallel	25	100
5V - 8/28V - 8/30V	SSI	100	300
5V - 8/28V - 8/30V	SSI	200	200
5V - 8/28V - 8/30V	SSI	400	50
5V - 8/28V - 8/30V	SSI	1000	10
12/28V	Analogue (current)	-	200

System setup: ambient temperature (20°C / +68°F), load current 20 mA, Eltra AWG 24 shielded cable.

Depending on the application, maximum cable length might be shorter, particular eg. where a high level of electrical noise is present. Please carefully select the power supply core diameter. Size should be enough to guarantee that encoder voltage levels will not go below minimum levels. Use always shielded cables, for further details or informations please directly contact our offices.

AUXILIARY INPUTS / OUTPUTS

INPUTS

UP/DOWN (U/D): when connected to logic HIGH encoder output will invert the counting direction. It is equivalent to rotate the encoder shaft in the opposite direction.

LATCH: when connected to logic state HIGH, it freezes the current data output. In this way, while the encoder shaft is turning, the output data does not change.

RESET: when connected to logic state HIGH it sets the output position to zero.

OUTPUTS

STROBE: available on absolute encoders with binary code. It goes to logic state HIGH when the output data is valid (all output data has been updated).

INPUT	STATE HIGH	STATE LOW
U / D	Inverts the code	No effect
LATCH	Blocks the code	No effect
RESET	Output reset	No effect

PROPER INSTALLATION OF CABLES

- Make sure cable shield is connected to the ground and avoid connecting it to the power ground (0 V).
- Keep the encoder cable (signal cable) sufficiently far from power lines.
- Choose the cable according to installation requirements.
- Lay the cable avoiding spirals.
- Minimum cable bending radius at least 10 times external diameter.

CONNECTOR

Connector type	Ref. code
JIS-C-5432 7 pins cable mount straight plug (female)	PLS-20-7 (PLT® Apex)
JIS-C-5432 10 pins cable mount straight plug (female)	SCC6A16-10S (Sam Woo Electronics)
MIL 7 pins cable mount straight plug (female)	MS3106-16S-1 (Amphenol®)
MIL 10 pins cable mount straight plug (female)	MS3106-18-1 (Amphenol®)
M23 12 pins cable mount straight plug (female)	M23 12 pins CCW (contact arrangements)
V 9 pins cable mount straight plug (female)	D-Subminiature DE-9
M 12 5 pins cable mount straight plug (female)	M12 5 pins A coded 360° totally shielded
M 12 8 pins cable mount straight plug (female)	M12 8 pins A coded 360° totally shielded
MIL 19 pins cable mount straight plug (female)	MS3116-14-19S (Amphenol®)
VB 15 pins cable mount straight plug (female)	D-Subminiature DA-15
VC 15 pins cable mount straight plug (female)	D-Subminiature DE-15 (high density)
S3 5 pins cable mount straight plug (female)	M12 5 pins B coded Profibus
MIL 32 pins cable mount straight plug (female)	62IN-16PHM21-1832S624 (Amphenol®)

CUSTOM CABLES AND MORE ...

- Custom cables, extensions and connector are available on demand.
- Testing on 100 % of the production.
- Anti-vibration wiring system.
- **Contact us for further informations.**

CABLES AVAILABILITY

N° WIRES	CEI MARKING	IEC MARKING	UL MARKING	SHIELD	INSTALLATION
5	CEI 20-22 II			FOIL	FIXED
		IEC 60332-1	UL-CSA	BRAID	FLEXIBLE
		IEC 60332-1	UL-CSA	FOIL	FIXED
	CEI 20-22 II	IEC 60332.3		BRAID	FIXED
8	CEI 20-22 II			FOIL	FIXED
	CEI 20-22 II			BRAID	FIXED
		IEC 60332-1	UL-CSA	BRAID	FLEXIBLE
		IEC 60332-1		FOIL	FIXED
10	CEI 20-22 II			BRAID	FIXED
12	CEI 20-22 II			FOIL	FIXED
16	CEI 20-22 II			FOIL	FIXED
32	CEI 20-22 II			FOIL	FIXED

Please directly contact our offices for non-standard cables availability

PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGES

Be sure the metallic case of the connector is connected to the ground through a ring fixed to the screw of the connector itself. (Fig. 1) Connect the cable shield to the ground and to the connector case. (Fig. 2)

Fig. 1















Fig. 2



For a better protection of the electronics against electrostatic discharges connect the metallic connector case to ground.

INSTALLATION AND OPERATION PRECAUTIONS

INSTALLATION AND OPERATION PRECAUTIONS

-  The encoder must be used with respect to its specifications. Encoder is a pulse generator and not a safety device.
-  Assembling and installing personnel must be qualified and carefully follow instructions of technical manuals.
-  Don't expose the device to stress or impacts in order to ensure the correct working otherwise the warranty expires.
-  Make sure that the mechanical coupling of the encoder shaft is designed with the appropriate elastic couplings, especially in the case of excessive axial or radial movements.
-  Make sure that the environment of use is free of corrosive agents (acids, etc.) or substances that are not compatible with the device.
-  Check the ground connection of the device if it is not possible to provide additional external connection.
-  Before putting it in operation, verify the voltage range applicable to the device and protect it from exceeding the stated technical specifications.
-  Connect power supply and signals cables in order to avoid capacitive or inductive interferences that may cause malfunction of the device.
-  **Cable wiring must be carried out in a POWER-OFF condition.**
-  **For safety reason, we strongly recommend to avoid any mechanical or electrical modification. In that case, they will void the warranty.**
-  For storage leave the products in the original packaging. The storage location should be free of dust, dry and temperature-regulated without chemical influences or mechanical shock / vibrations.
-  For storage times greater than 12 months please rotate the encoder shaft every 12 months at low-speed (e.g. by hand) to allow bearing lubrication to distribute.

MAIN PRODUCT WARRANTY TERMS

Replacements or repairs whether under the warranty or at the customer's expense must be performed in the service department of Eltra or by explicitly authorized personnel. Before sending material for repairing, you must obtain an RMA number from our sales office.

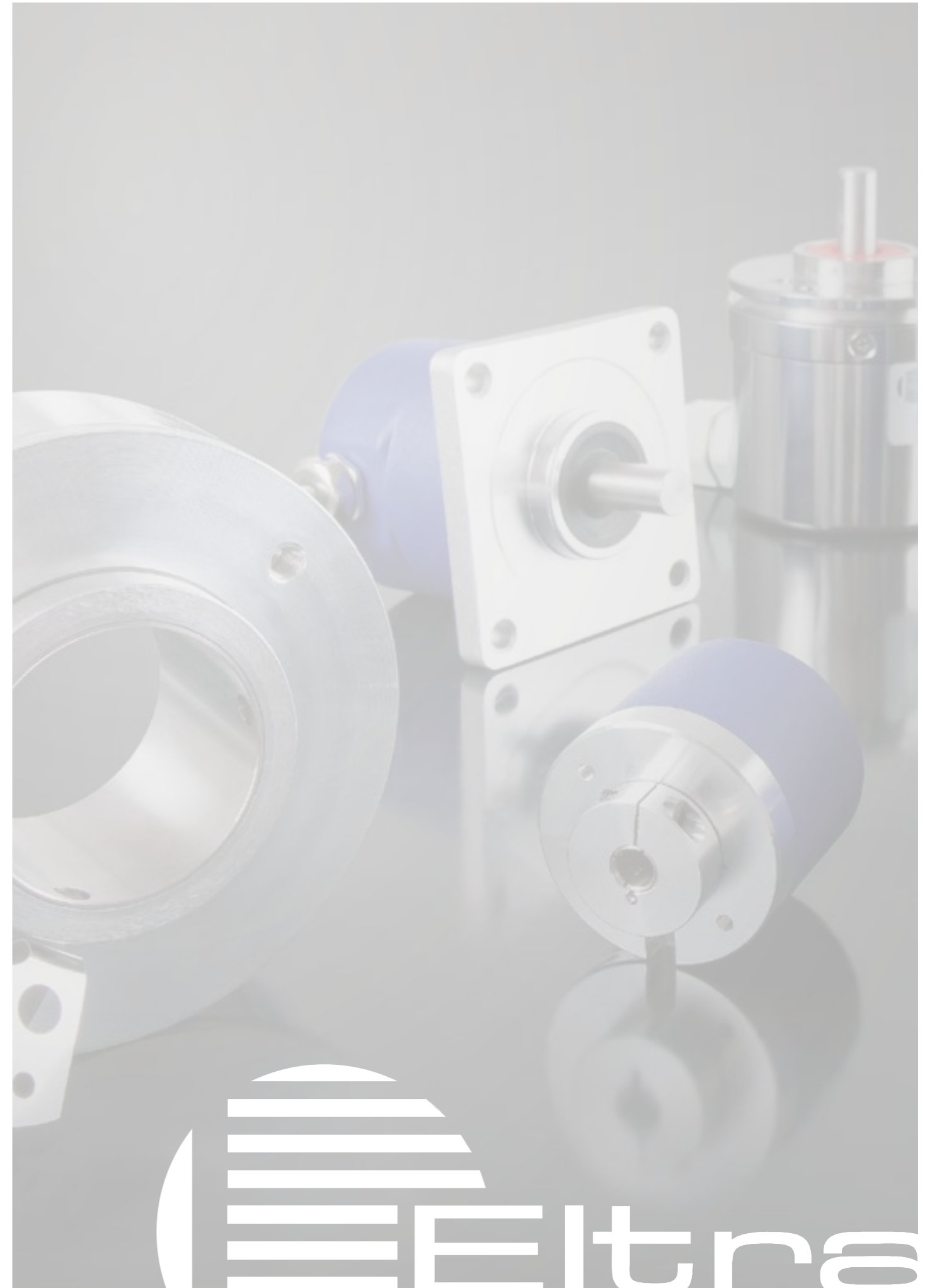
During the repair process in our service department, Eltra will be authorized to remove all parts that the customer added to the product.

Any malfunction due to a failure to observe these usage and installation precautions will lead to the warranty voiding.

Repairs will not extend the product warranty.

We also exclude compensation for any type of damage or injury due to the use, or suspension of use, of the transducer.

For any additional information, please refer to the sale terms on our website, www.eltra.it, or call our office.





INCREMENTAL ENCODER

**DESIGNED IN ORDER TO CONTROL THE POSITION
AND THE ANGULAR SPEED OF MOVING MECHANICAL
AXES.**

*Main application field are: wood-working
machinery, textile machines, CNC machinery,
and so forth.*

*ELTRA brand encoders offers a complete range
of encoders with resolution up to 24000 pulses
per turn (ppr) with a wide flange choice and
several electrical interfaces. Shaft, blind
hollow shaft and through hollow shaft up to a
diameter of 60 mm (2.36") are available.*

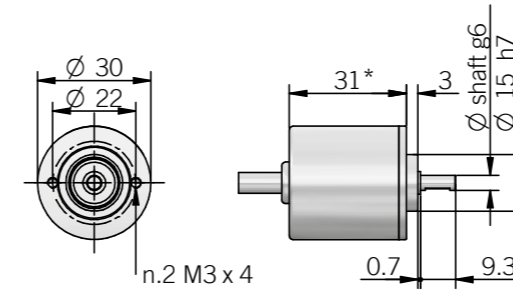
MAIN FEATURES

Miniaturized \varnothing 30 mm encoder series for application in small devices.
Recommended when a minimal size is required even providing excellent performances.

- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 220 kHz output frequency
- Cable output, connector available on cable end
- Solid shaft diameter up to 6 mm
- Mounting by clamping or threaded flange

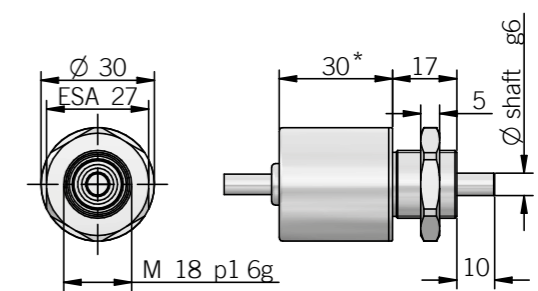


30 E (axial output)



dimensions in mm

30 H (axial output)



* radial output + 2,3

ORDERING CODE

EL	30E	50	S	5/28	C	4	X	3	PA	.XXX
<p>SERIES incremental encoder series EL incremental encoder series ER</p> <p>MODEL clamping flange \varnothing 15 mm 30E M18 threaded flange 30H</p> <p>RESOLUTION ppr from 1 to 2500 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS</p> <p>SHAFT DIAMETER (mod. E) mm 4 mm 6</p> <p>ENCLOSURE RATING IP 54 X</p> <p>MAX ROTATION SPEED 3000 rpm 3</p> <p>OUTPUT TYPE axial cable (standard length 0,5 m) PA radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)</p> <p>VARIANT custom version XXX</p>										

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 2500 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	100 kHz EL series 220 kHz ER series
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	\varnothing 4 / 6 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,05 x 10 ⁻⁶ kgm ² (1,2 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,005 Nm (0,71 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PAG6 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	70 g (2,47 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

EL SERIES RESOLUTIONS

1 - 10 - 20 - 25 - 50 - 60 - 64 - 150

ER SERIES RESOLUTIONS

100 - 128 - 200 - 250 - 256 - 300 - 360 - 400 - 500 - 512 - 600 - 625 - 720 - 800 - 1000 - 1024 - 1200 - 1250 - 1440 - 1600 - 2000 - 2048 - 2500

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Miniaturized \varnothing 38 mm encoder series for application in small devices.
Recommended when a minimal size is required even providing excellent performances.

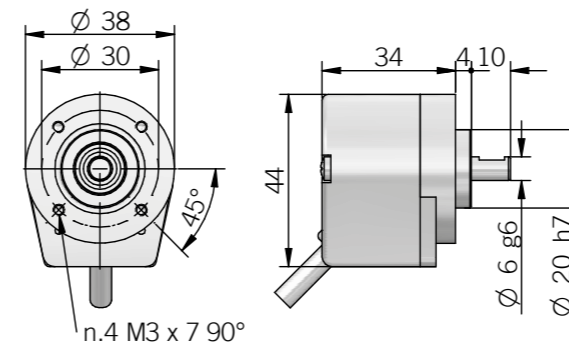
- 3 channel encoder (A / B / Z) up to 1024 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Cable output, connector available on cable end
- Solid shaft diameter up to 6 mm
- Mounting by clamping or centering square flange



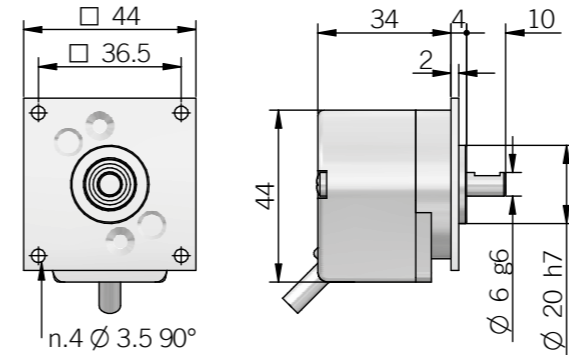
ORDERING CODE

EH	38A	500	S	8/24	P	6	X	3	PR	.XXX
SERIES incremental encoder series EH										
MODEL clamping flange \varnothing 20 mm 38A square flange \square 36,5 mm 38B square flange \square 32 mm 38D										
RESOLUTION ppr from 50 to 1024 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY 5 V DC 5 8 ... 24 V DC 8/24										
ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 8/24V - output RS-422 RS										
SHAFT DIAMETER mm 6										
ENCLOSURE RATING IP 54 X										
MAX ROTATION SPEED 3000 rpm 3										
OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

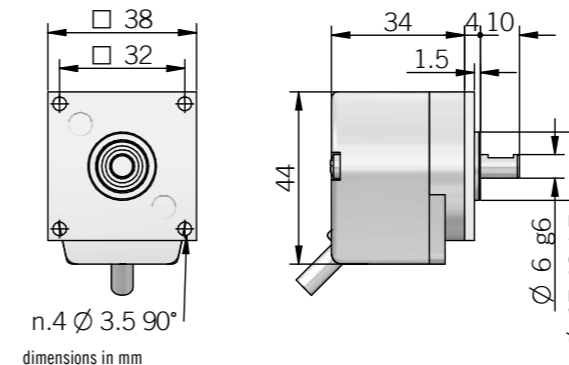
38 A



38 B



38 D



ELECTRICAL SPECIFICATIONS

Resolution	from 50 to 1024 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	\varnothing 6 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	$0,05 \times 10^{-6} \text{ kgm}^2$ ($1,2 \times 10^{-6} \text{ lbft}^2$)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	aluminum UNI 5076
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +70°C (-4° ... +158°F)
Storage temperature	-20° ... +70°C (-4° ... +158°F)
Weight	150 g (5,29 oz)

CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
\equiv	shield	shield

RESOLUTIONS

50* - **100** - 200 - 250 - 256 - 360 - 400 - **500** - **512** - **1000** - 1024

please directly contact our offices for other pulses, preferred resolutions in bold

*available only without zero pulse

EL - ER 40 A/B/C/H/I/N/X SOLID SHAFT INCREMENTAL ENCODER

MAIN FEATURES

Miniaturized $\varnothing 42$ mm encoder series for general factory automation applications.

- 3 channel encoder (A / B / Z) up to 14400 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable output, connector available on cable end
- Solid shaft diameter up to 8 mm
- Mounting by clamping, threaded or synchronous flange

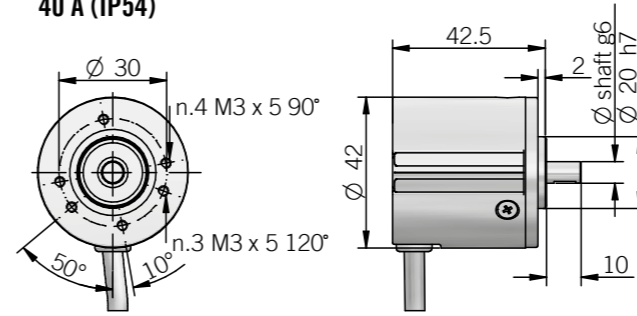


ORDERING CODE

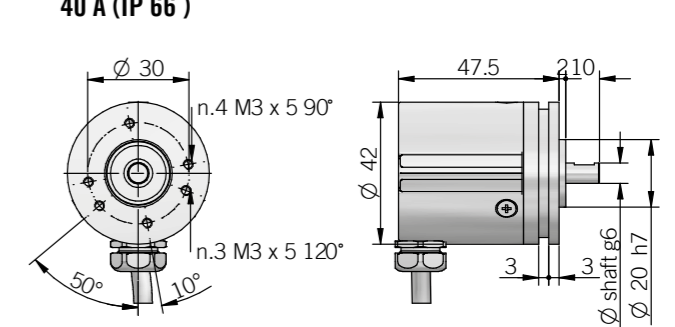
ER	40A	100	S	5/28	P	6	X	6	P	R	.XXX
<p>SERIES incremental encoder series EL incremental encoder series ER</p> <p>MODEL clamping flange $\varnothing 20$ mm 40A square flange $\square 36,5$ mm 40B clamping flange $\varnothing 17,46$ mm 40C M18 threaded flange 40H M20 threaded flange 40I synchronous flange $\varnothing 21$ mm 40N synchronous flange $\varnothing 30$ mm 40X</p> <p>RESOLUTION (mod. A / B) ppr from 1 to 14400 (mod. C / H / I / N / X) ppr from 1 to 2500 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS</p> <p>SHAFT DIAMETER (mod. C) mm 4 (mod. A / B / C / H / I / N) mm 6 (mod. X) mm 8</p> <p>ENCLOSURE RATING IP 54 X (mod. A / B) IP 66 S</p> <p>MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6</p> <p>OUTPUT TYPE cable (standard length 0,5 m) P preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)</p> <p>DIRECTION TYPE (mod. A / B / C / H / I / N) axial A radial R</p> <p>VARIANT custom version XXX</p>											

OPTICAL SOLID SHAFT INCREMENTAL ENCODERS | EL - ER 40 A/B/C/H/I/N/X

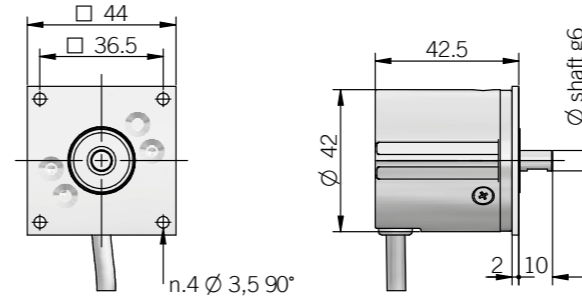
40 A (IP54)



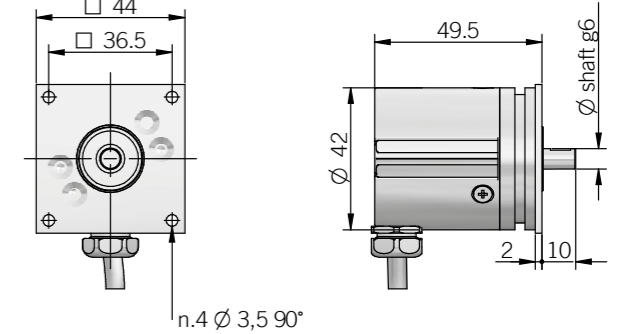
40 A (IP 66)



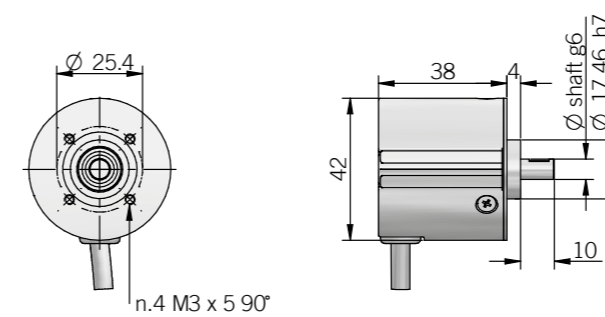
40 B (IP54)



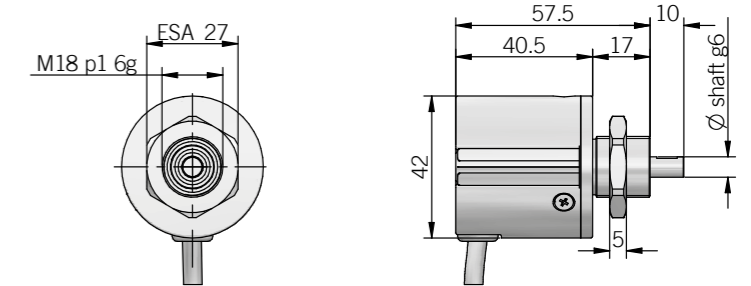
40 B (IP 66)



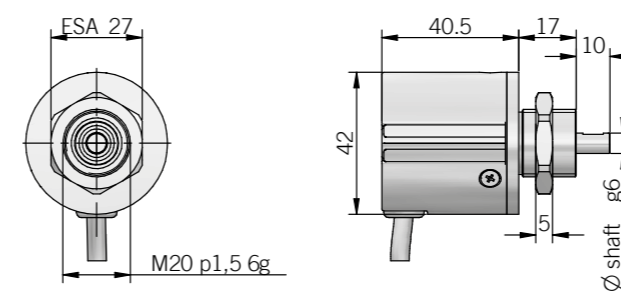
40 C



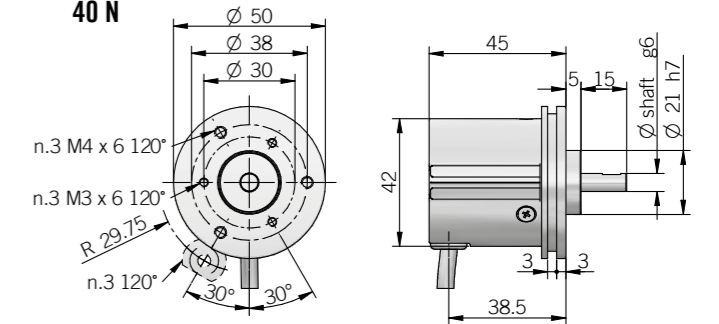
40 H



40 I

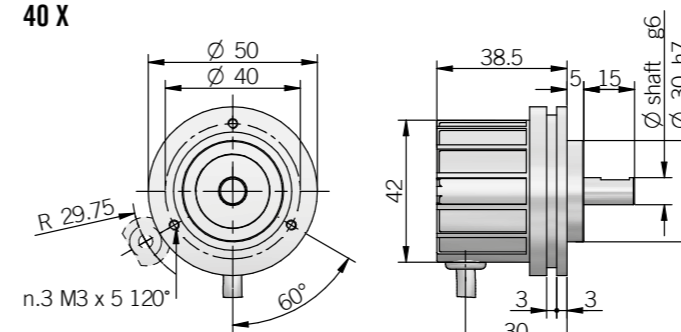


40 N



fixing clamps not included, please refer to Accessories section

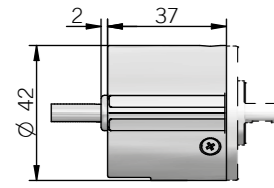
40 X



dimensions in mm

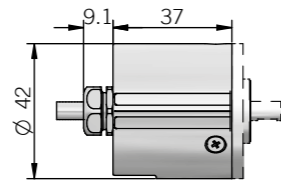
fixing clamps not included, please refer to Accessories section

40 (axial output)



dimensions in mm

40 (IP 66 axial output)



ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 14400 ppr (mod. A / B) from 1 to 2500 ppr (mod. C / H / I / N / X)
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	EL series 150 kHz EL series ER series 250 kHz up to 3600 ppr 500 kHz from 4000 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 30 - 32 - 40 - 50 - 70 - 80 - 90 - 750 - 1500

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - 360 - 400 - 480 - 500 - 512 - 600 - 625 - 720 - 800 - 900 - 1000 - 1024 - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 10000 - 12000 - 14400

please directly contact our offices for other pulses, preferred resolutions in bold

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 4 / 6 / 8 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,1 x 10 ⁻⁶ kgm ² (2,4 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin) IP 54 < 0,05 Nm (7,10 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	100 g (3,52 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MAIN FEATURES

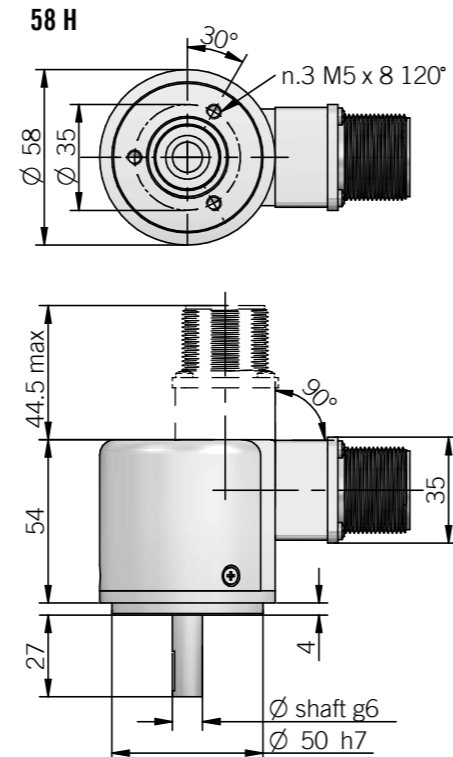
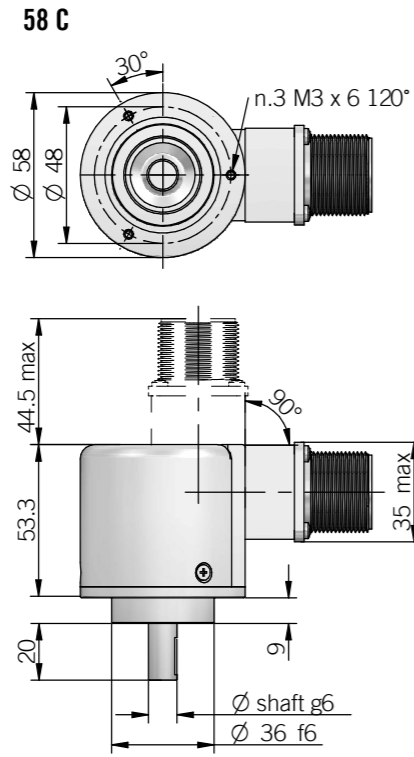
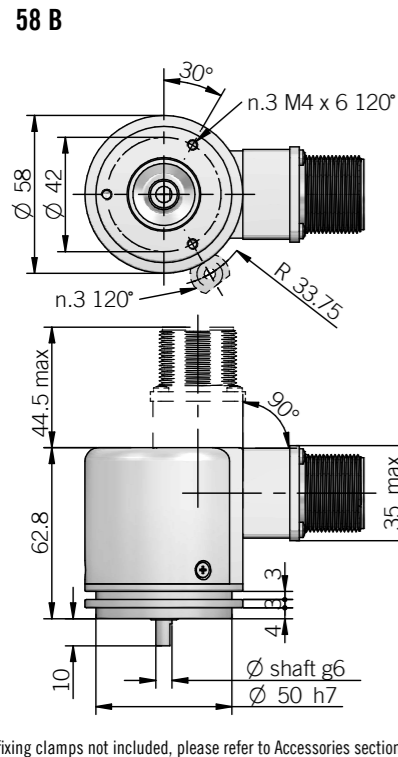
Standard ø 58 mm encoder series for industrial applications with high mechanical resistance requirements. These encoders are designed to support high radial and axial shaft load and they can be mounted by means of flanges or fixing clamps.

- 3 channel encoder (A / B / Z) up to 24000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Available with metal cover for heavy duty applications
- Solid shaft diameter up to 12 mm
- Mounting by synchronous, clamping or coupling flange

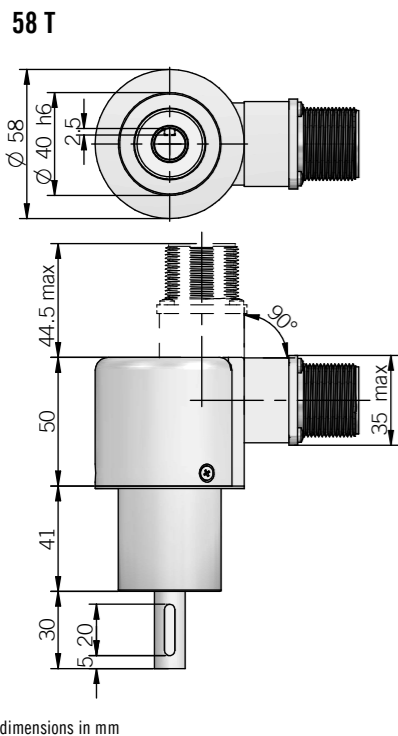


ORDERING CODE ER 58C M* 500 S 5/28 P 8 X 6 P R .XXX

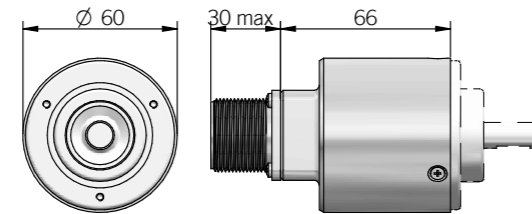
SERIES	MODEL	METAL COVER	RESOLUTION	ZERO PULSE	POWER SUPPLY	ELECTRICAL INTERFACE	SHAFT DIAMETER	ENCLOSURE RATING	MAX ROTATION SPEED	OUTPUT TYPE	DIRECTION TYPE	VARIANT
incremental encoder series EL incremental encoder series ER	synchronous flange ø 50 mm 58B clamping flange ø 36 mm 58C clamping flange ø 50 mm 58H coupling flange ø 40 mm 58T	* add for metal cover M	ppr from 1 to 24000 see table for pulses availability	without zero pulse S with zero pulse Z	(with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	(mod. B) mm 6 (mod. C) mm 8 (mod. B / C / H) (3/8") 9,52 mm 9 mm 10 (mod. T) mm 12	IP 54 X IP 66 S	(IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6	cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J M12 connector M12 M23 connector H IP40 IEC 60130-9 connector C female connector included, without female please add 162 as variant code	axial A radial R	custom version XXX



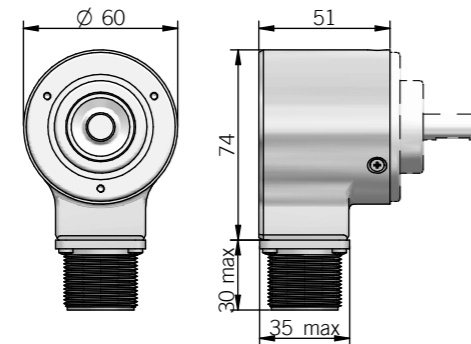
fixing clamps not included, please refer to Accessories section



Dimension with metal cover and axial output



Dimension with metal cover and radial output



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 24000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 160 - 180 - 350 - 450 - 660 - 700 - 750 - 1500

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - 360 - 400 - 480 - 500 - 512 - 600 - 625 - 720 - 800 - 900 - 1000 - 1024 - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 9000 - 10000 - 10240 - 12000 - 14400 - 16000 - 16384 - 18000 - 20000 - 20480 - 24000

please directly contact our offices for other pulses, preferred resolutions in bold

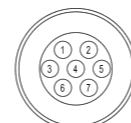
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 8 / 9,52 (3/8") / 10 / 12 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - EL 3000 rpm / 60° C ER 3000 rpm / 70° C - 2000 rpm / 85° C
Max shaft load	10 N axial / 20 N radial with ø6 mm shaft 200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	350 g (12,35 oz) 450 g (15,87 oz) with metal cover

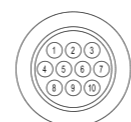
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
\equiv	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

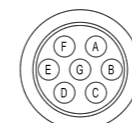
J connector (7 pin) JIS-C-5432 Size 16 solder side view FV



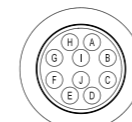
J connector (10 pin) JIS-C-5432 Size 16 solder side view FV



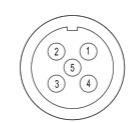
M connector (7 pin) Amphenol MS3102-E-16-S solder side view FV



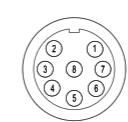
M connector (10 pin) Amphenol MS3102-E-18-1 solder side view FV



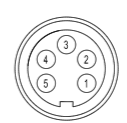
M12 connector (5 pin) M12 A coded solder side view FV



M12 connector (8 pin) M12 A coded solder side view FV



C connector (5 pin) IEC 60130-9 solder side view FV



C connector (8 pin) IEC 60130-9 solder side view FV



H connector (12 pin) - M23 CCW Hummel 7.410.000000 - 7.002.912.603 solder side view FV



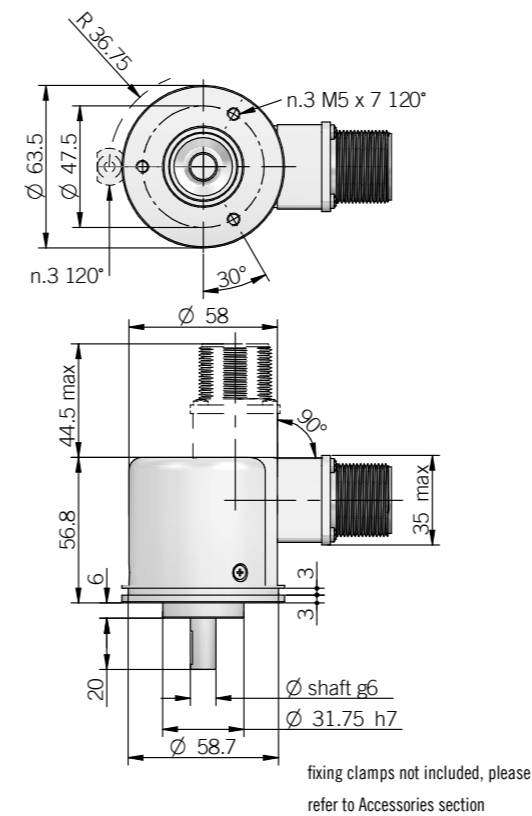
MAIN FEATURES

Standard \varnothing 63 mm encoder series for industrial applications with high mechanical resistance requirements. These encoders are designed to support high radial and axial shaft load and they can be mounted by means of flanges or fixing clamps.

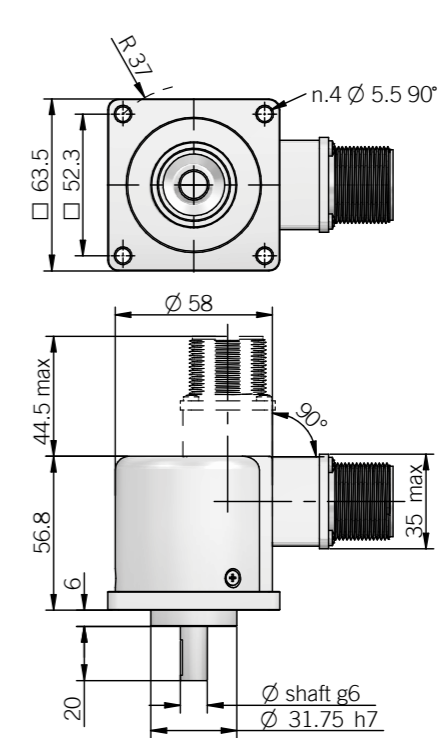
- 3 channel encoder (A / B / Z) up to 24000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Available with metal cover for heavy duty applications
- Solid shaft diameter up to 10 mm
- Mounting by synchronous or centering 2,5" square flange



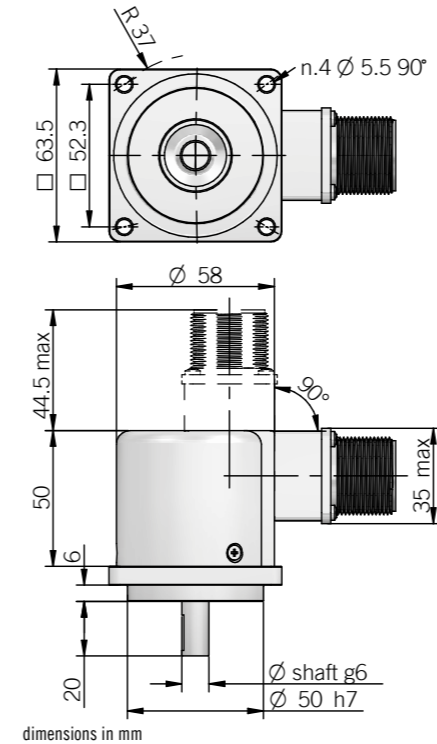
63 A



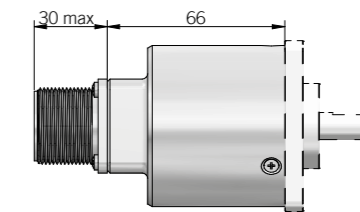
63 D



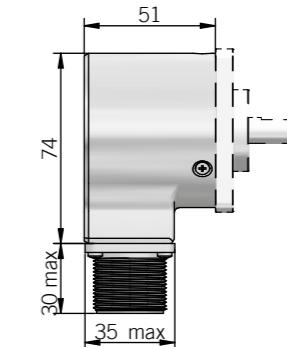
63 E



Dimension with metal cover and axial output



Dimension with metal cover and radial output



ORDERING CODE

ER	63A	M*	500	S	5/28	P	8	X	6	P	R	.XXX
<p>SERIES incremental encoder series EL incremental encoder series ER</p> <p>MODEL synchronous flange \varnothing 31,75 mm 63A centering square flange \varnothing 31,75 mm 63D centering square flange \varnothing 50 mm 63E</p> <p>METAL COVER * add for metal cover M</p> <p>RESOLUTION ppr from 1 to 24000 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS</p> <p>SHAFT DIAMETER mm 8 (3/8") 9,52 mm 9 mm 10</p> <p>ENCLOSURE RATING IP 54 X IP 66 S</p> <p>MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6</p> <p>OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J M12 connector M12 M23 connector H IP40 IEC 60130-9 connector C female connector included, without female please add 162 as variant code</p> <p>DIRECTION TYPE axial A radial R</p> <p>VARIANT custom version XXX</p>												

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 24000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 160 - 180 - 350 - 450 - 660 - 700 - 750 - 1500

ER SERIES RESOLUTIONS

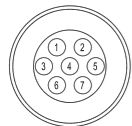
100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - **360** - 400 - 480 - **500** - 512 - 600 - 625 - **720** - 800 - 900 - **1000** - 1024 - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 9000 - 10000 - 10240 - 12000 - 14400 - 16000 - 16384 - 18000 - 20000 - 20480 - 24000

please directly contact our offices for other pulses, preferred resolutions in bold

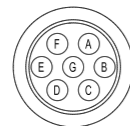
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
⊘	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

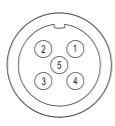
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



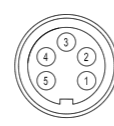
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



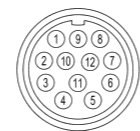
M12 connector (5 pin)
M12 A coded
solder side view FV



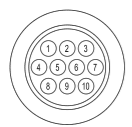
C connector (5 pin)
IEC 60130-9
solder side view FV



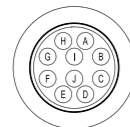
H connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



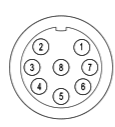
J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



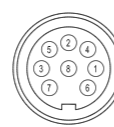
M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



C connector (8 pin)
IEC 60130-9
solder side view FV



MECHANICAL SPECIFICATIONS

Shaft diameter	ø 8 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - EL 3000 rpm / 60° C ER 3000 rpm / 70° C - 2000 rpm / 85° C
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	350 g (12,35 oz) 450 g (15,87 oz) with metal cover

MAIN FEATURES

Explosion proof encoder for applications within explosive and hazardous areas.

- 3 channel encoder (A / B / Z) up to 10000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- 10 mm solid shaft diameter
- Mounting by synchronous or centering square flange

EX CLASSIFICATION

It has been assured with EC-TYPE Examination Certificate CESI 04 ATEX 082 that the EX 80 comply with essential health and safety requirements according to

- EN 60079-0:2012+A11:2013
- EN 60079-1:2007
- EN 60079-31:2014

Declaration of conformity and CE declaration are available for download from Eltra website www.eltra.it

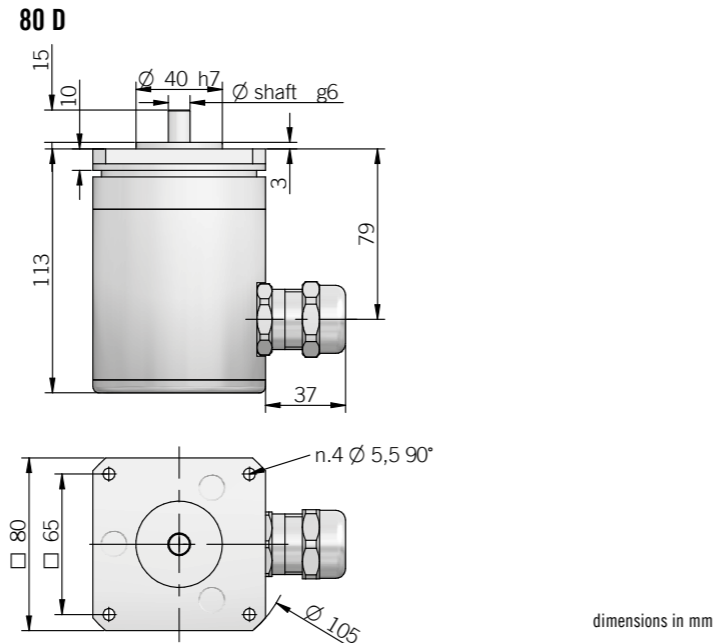
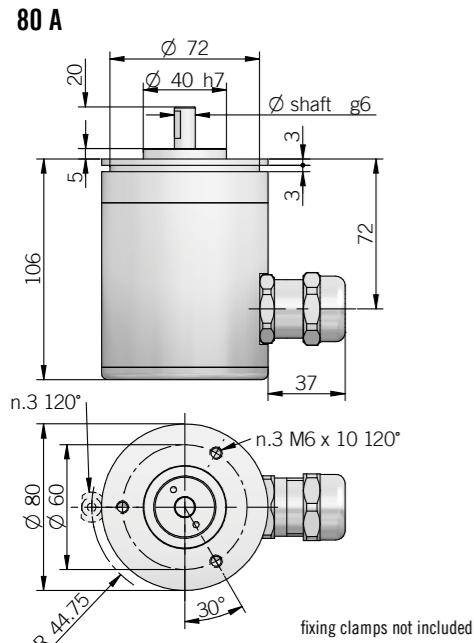


ORDERING CODE

EX 80A 500 S 5/28 P 10 X 3 PR .XXX

SERIES	explosion proof encoder series EX
MODEL	synchronous flange ø 40 mm 80A centering square flange ø 40 mm 80D
RESOLUTION	ppr from 100 to 10000 see table for pulses availability
ZERO PULSE	without zero pulse S with zero pulse Z
POWER SUPPLY	(with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28
ELECTRICAL INTERFACE	NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS
SHAFT DIAMETER	mm 10
ENCLOSURE RATING	IP 65 X
MAX ROTATION SPEED	3000 rpm 3
OUTPUT TYPE	radial cable (standard length 1,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)

VARIANT
custom version XXX



ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 10000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Current consumption without load	80 mA max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 10 mm
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin) (4,25 Ozin)
Bearing stage material	anodized aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	anodized aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +50°C (-4° ... +122°F)
Storage temperature	-20° ... +70°C (-4° ... +158°F)
Weight	1200 g (42,33 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	brown	brown
0 V	gray	gray
Ch. A	green	green
Ch. A-	/	red
Ch. B	yellow	yellow
Ch. B-	/	pink
Ch. Z	white	blue
Ch. Z-	/	white
⊕	shield	shield

RESOLUTIONS

100 - 200 - 360 - 400 - 500 - 1000 - 1024 - 1440 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 9000 - 10000

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Encoder series for harsh environments with high mechanical resistance requirements. Model 90 can be mounted by flanges or fixing clamps; model 115 has a tachometer generator REO-444 type compatible plug with optional centrifugal relay.

- 3 channel encoder (A / B / Z) up to 2048 ppr
- Redundancy with double electronics and / or double resolutions
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Solid shaft diameter up to 11 mm
- Mounting by synchronous or REO-444 flange
- Model 115R available with centrifugal relay



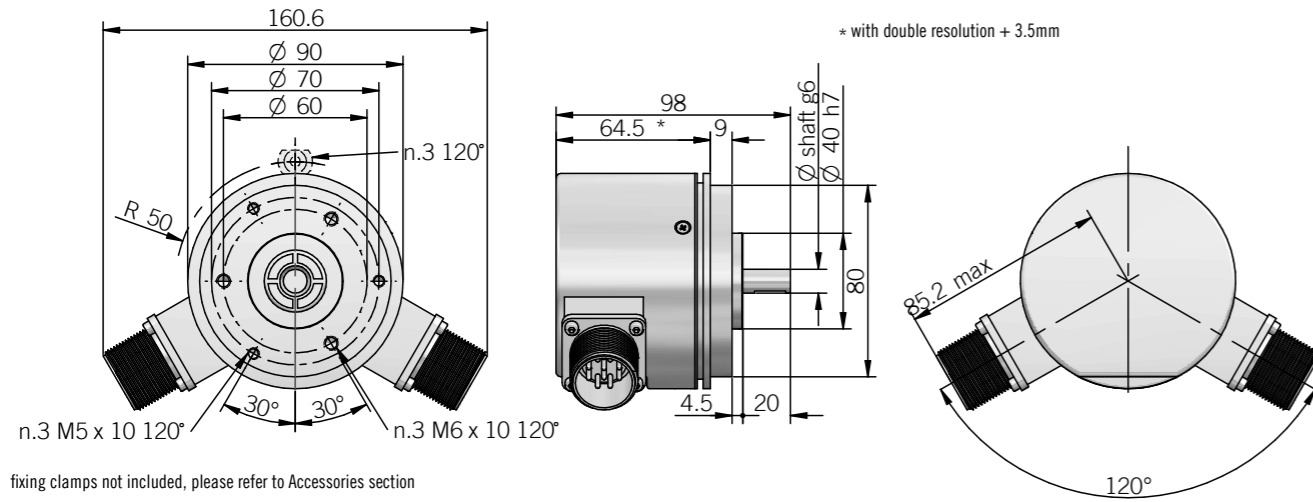
ORDERING CODE EH 90A 500 S 8/24 P 1000 Z 8/24 P 8 X 6 P R . XXX + 2000

SERIES incremental encoder series EH	MODEL synchronous flange Ø 40 mm 90A flange REO-444 115A flange REO-444 with centrifugal relay 115R	RESOLUTION ppr from 200 to 2048 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L	RESOLUTION	ZERO PULSE	POWER SUPPLY	ELECTRICAL INTERFACE	SHAFT DIAMETER (mod. 90A) mm 8 (mod. 90A) (3/8") 9,52 mm 9 mm 10 (mod. 115A - 115R) mm 11	ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S	MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6	OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX	RELAY INTERVENTION SPEED (mod. 115R) from 600 to 4300 for other speeds please contact our offices directly
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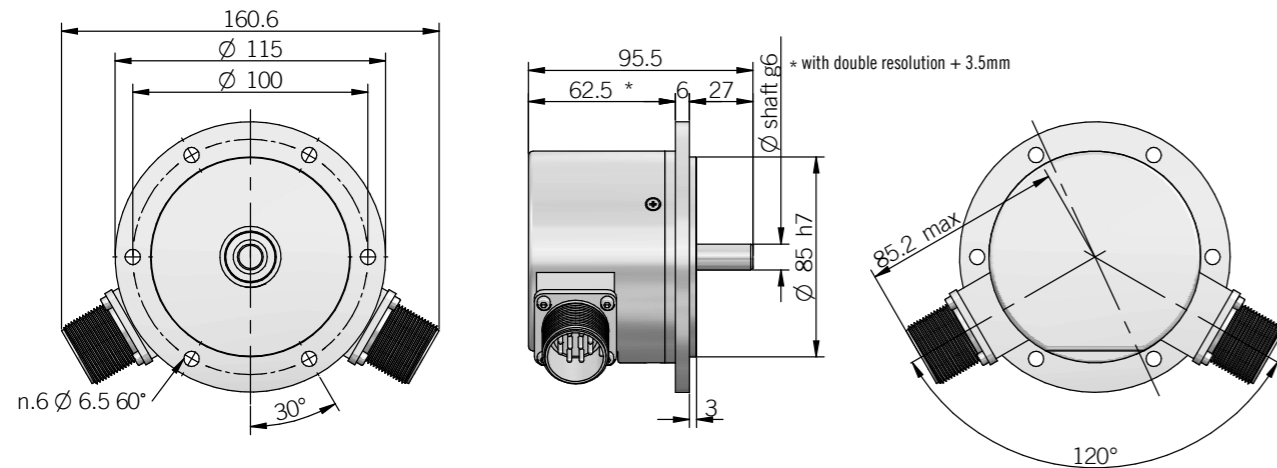
To be indicated only in the models 90A - 115A for double electronics and double resolution
See examples:

- Double resolution and double electronics: EH90A1024Z5L-2048Z8/24L10X...
- Double resolution and same electronics: EH90A1024-2048Z5L10X...
- Same resolution and double electronics: EH90A1024Z5L-Z8/24L10X...

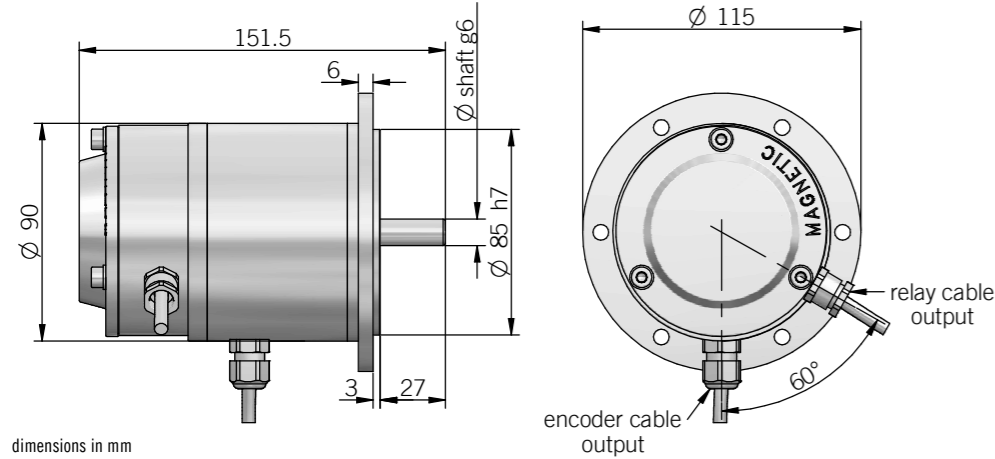
90 A with double electronics / resolutions



115 A with double electronics / resolutions



115 R



ELECTRICAL SPECIFICATIONS

Resolution	from 200 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RESOLUTIONS

200 - 250 - 500 - 512 - **1000** - **1024** - 2000 - 2048

please directly contact our offices for other pulses, preferred resolutions in bold

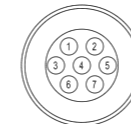
RELAY CHARACTERISTICS

Intervention speed	from 600 to 4300 rpm
Accuracy	± 3 %
Contact capacity	2 A / 250 V AC 3,3 A / 125 V AC
Type of contact	Normally Closed (NC)

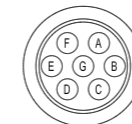
CONNECTIONS

Function	Cable C / P	Cable L	7 pin J C / P	7 pin J L no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L with Zero	10 pin M L with Zero
+V DC	red	red	6	4	F	D	4 - 5	D - E
0 V	black	black	1	6	A	F	6	F
Ch. A	green	green	3	1	C	A	1	A
Ch. A-	/	brown	/	3	/	C	7	G
Ch. B	yellow	yellow	5	2	E	B	2	B
Ch. B-	/	orange	/	5	/	E	8	H
Ch. Z	blue	blue	4	/	D	/	3	C
Ch. Z-	/	white	/	/	/	/	9	I
≡	shield	shield	7	7	G	G	10	J

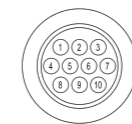
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



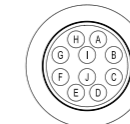
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 8 / 9,52 (3/8") / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	3,5 x 10 ⁻⁶ kgm ² (83 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,8 OzIn) IP 54 < 0,06 Nm (8,5 OzIn) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	750 g (26,46 oz) 1050 g (37,04 oz) with relay

EL - ER 90 A EL - ER 115 A

SOLID SHAFT INCREMENTAL ENCODER

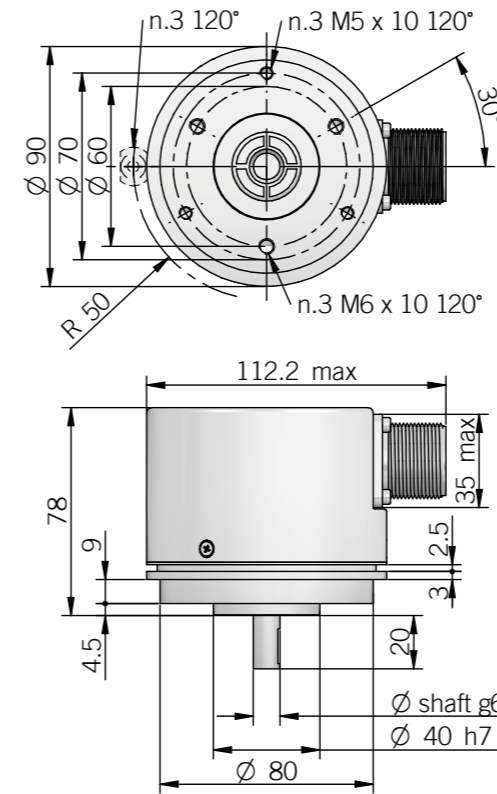
MAIN FEATURES

Encoder series for harsh environments with high mechanical resistance requirements. Model 90 can be mounted by flanges or fixing clamps; model 115 has a tachometer generator REO-444 type compatible plug.

- 3 channel encoder (A / B / Z) up to 10000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Metal cover for heavy duty applications
- Solid shaft diameter up to 11 mm
- Mounting by synchronous or REO-444 flange

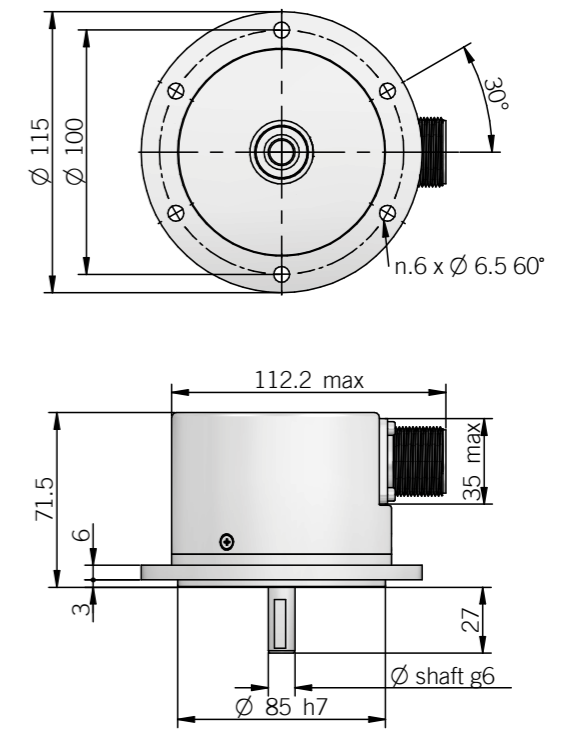


90 A

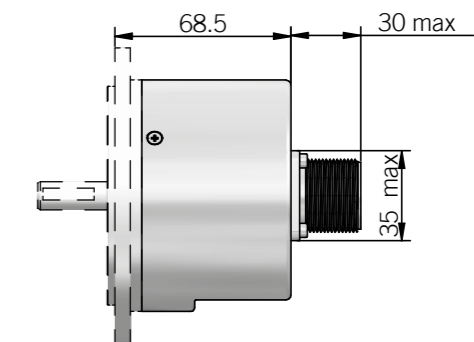


fixing clamps not included, please refer to Accessories section

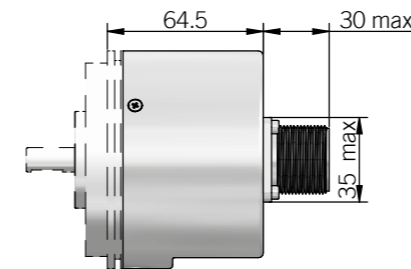
115 A



115 A axial output



90 A axial output



dimensions in mm

ORDERING CODE

ER	90A	500	S	5/28	P	8	X	6	P	R	.XXX
SERIES incremental encoder series EL incremental encoder series ER	MODEL synchronous flange ø 40 mm 90A flange REO-444 115A	RESOLUTION ppr from 1 to 10000 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	SHAFT DIAMETER (mod. 90) mm 8 (mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11	ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S	MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6	OUTPUT TYPE cable (standard length 1.5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 10000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 160 - 180 - 350 - 450 - 660 - 700 - 750 - 1500

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - **360** - 400 - 480 - **500** - **512** - 600 - 625 - **720** - 800 - 900 - **1000** - **1024** - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - **2048** - **2500** - 3000 - **3600** - 4000 - 4096 - **5000** - 6000 - **7200** - 8000 - 8192 - 9000 - **10000**

please directly contact our offices for other pulses, preferred resolutions in bold

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 8 / 9,52 (3/8") / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - EL 3000 rpm / 60° C ER 3000 rpm / 70° C - 2000 rpm / 85° C
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	3,5 x 10 ⁻⁶ kgm ² (83 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	350 g (12,35 oz) 450 g (15,87 oz) with metal cover

MAIN FEATURES

Series of miniaturized encoders for integration on small size AC/DC motors, stepper motors or for limited size applications.

- 3 channel encoder (A / B / Z) up to 1024 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- No wear due to absence of bearings
- Easy assembly
- Compact size



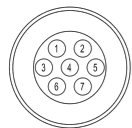
ORDERING CODE

	EH	30M	500	S	8/24	P	6	X	6	PR	.XXX
SERIES	incremental encoder series EH										
MODEL	kit encoder with flange 17M kit encoder 30M										
RESOLUTION	ppr from 50 to 1024 see table for pulses availability										
ZERO PULSE	without zero pulse S with zero pulse Z										
POWER SUPPLY	5 V DC 5 8 ... 24 V DC 8/24										
ELECTRICAL INTERFACE	NPN open collector C push-pull P line driver L power supply 8/24V - output RS-422 RS										
BORE DIAMETER	mm 6 (1/4") mm 6,35										
ENCLOSURE RATING	(mod. 17M) IP40 - (mod. 30M) IP 54 X										
MAX ROTATION SPEED	6000 rpm 6										
OUTPUT TYPE	radial cable (standard length 0,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT	custom version XXX										

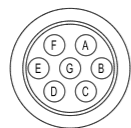
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero
+V DC	red	red	6	4	F	D	4 - 5	D - E
0 V	black	black	1	6	A	F	6	F
Ch. A	green	green	3	1	C	A	1	A
Ch. A-	/	brown	/	3	/	C	7	G
Ch. B	yellow	yellow	5	2	E	B	2	B
Ch. B-	/	orange	/	5	/	E	8	H
Ch. Z	blue	blue	4	/	D	/	3	C
Ch. Z-	/	white	/	/	/	/	9	I
⊥	shield	shield	7	7	G	G	10	J

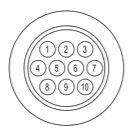
J connector (7 pin) JIS-C-5432 Size 16 solder side view FV



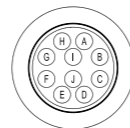
M connector (7 pin) Amphenol MS3102-E-16-S solder side view FV

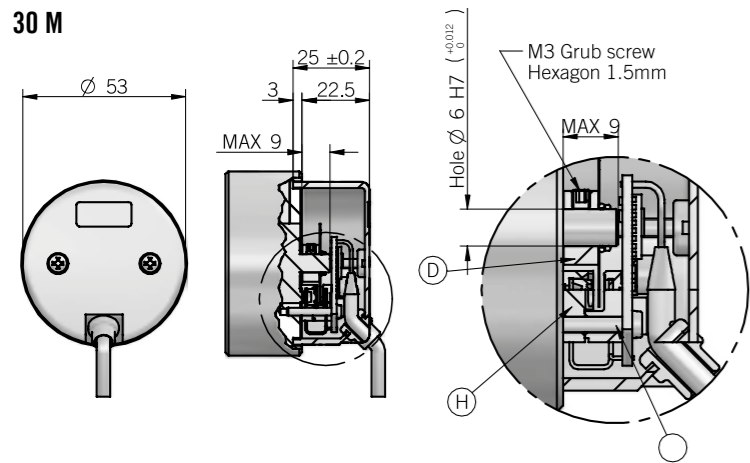
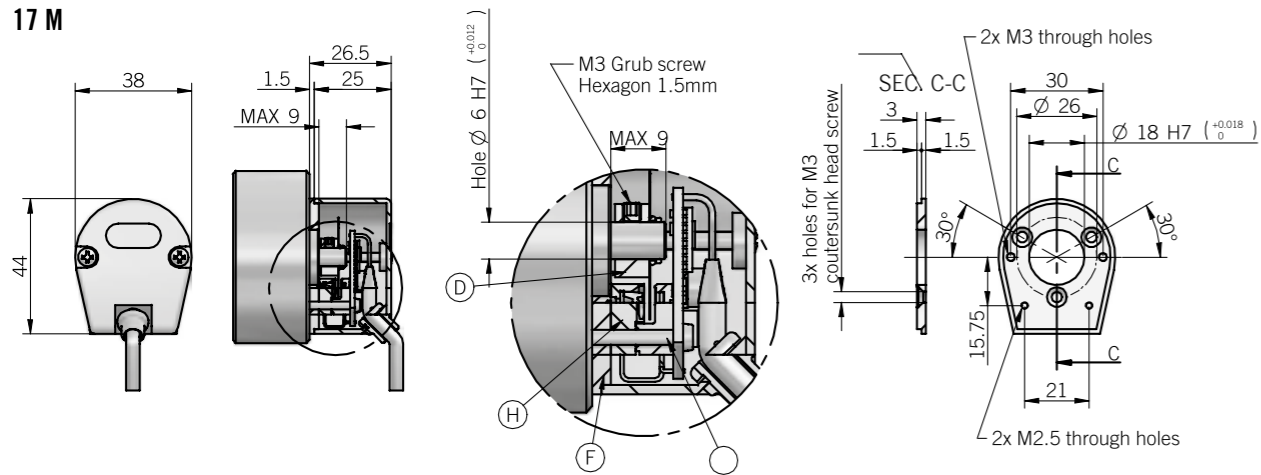


J connector (10 pin) JIS-C-5432 Size 16 solder side view FV



M connector (10 pin) Amphenol MS3102-E-18-1 solder side view FV





dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 50 to 1024 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RESOLUTIONS

50* - 100 - 200 - 250 - 256 - 360 - 400 - 500 - 512 - 1000 - 1024

*available only without zero pulse
please directly contact our offices for other pulses, preferred resolutions in bold

HS

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊖	shield	shield

HS

MECHANICAL SPECIFICATIONS

Bore diameter	ø 6 / 6,35 (1/4") mm
Enclosure rating	mod. 17M IP 40 (IEC 60529) mod. 30M IP 54 (IEC 60529) when properly installed with oring (not supplied)
Max rotation speed	6000 rpm (limited by output frequency)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbft ²)
Flange material (mod. 17)	aluminium
Hub material	EN-AW 2011 aluminium
Cover material	PA66 glass fiber reinforced
Operating temperature	-20° ... +60°C (-4° ... +140°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Shaft axial play	± 0,1 mm
Shaft eccentricity (plus radial play)	± 0,04 mm
Fixing torque for grub screws	40 cNm (57 Ozin) max
Weight	50 g (1,76 oz)

MAIN FEATURES

Series of miniaturized encoders with high resolution for integration on small size AC/DC motors, stepper motors or for limited size applications.

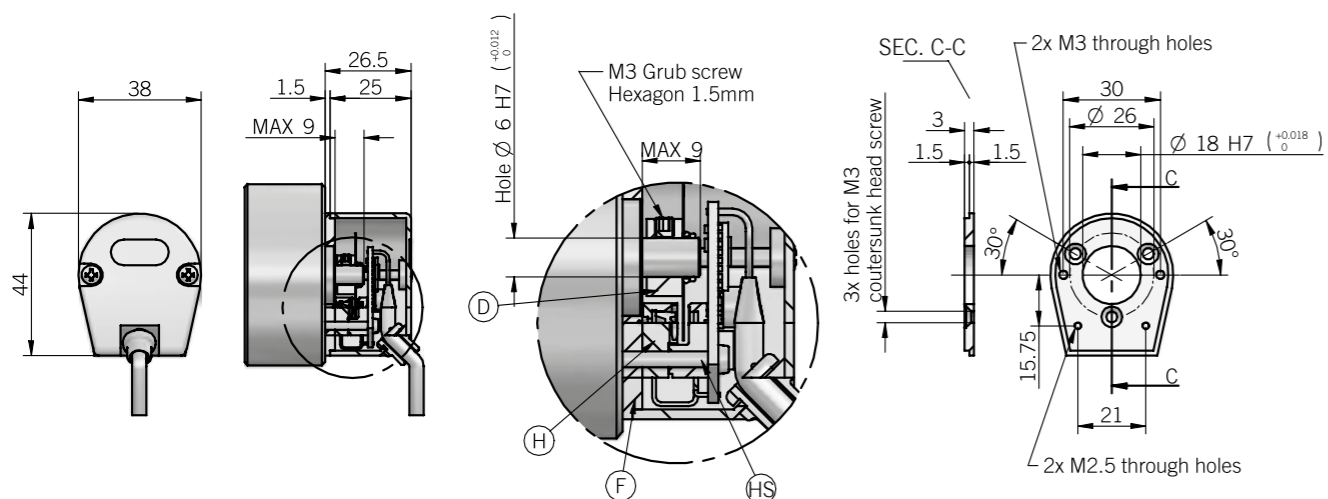
- 3 channel encoder (A / B / Z) up to 5000 ppr
- Power supply up to +30 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- No wear due to absence of bearings
- Easy assembly
- Compact size



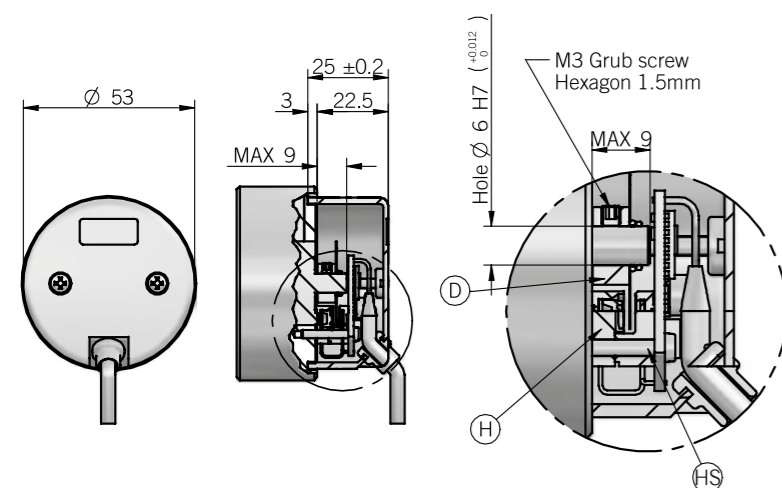
ORDERING CODE

EH	30MH	2000	S	5/30	P	6	X	X	PR	.XXX
SERIES incremental encoder series EH										
TYPE high resolution kit encoder with flange 17MH high resolution kit encoder 30MH										
RESOLUTION ppr 2000 / 2048 / 2500 / 4096 / 5000										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY 5 ... 30 V DC 5/30										
ELECTRICAL INTERFACE push-pull P line driver L power supply 5/30V - output RS-422 RS										
BORE DIAMETER mm 6 (1/4") mm 6,35										
ENCLOSURE RATING (mod. 17MH) IP40 - (mod. 30MH) IP 54 X										
OPTION to be reported X										
OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

17 MH



30 MH



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	2000 - 2048 - 2500 - 4096 - 5000 ppr
Power supply	4,5 ... 30 V DC (reverse polarity protection)
Current consumption without load	60 mA max
Max load current	20 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	500 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⏏	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6 / 6,35 (1/4") mm
Enclosure rating	mod. 17MH IP 40 (IEC 60529) mod. 30MH IP 54 (IEC 60529) when properly installed with oring (not supplied)
Max rotation speed	6000 prm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbft ²)
Flange material (mod. 17)	aluminium
Hub material	EN-AW 2011 aluminium
Cover material	PA66 glass fiber reinforced
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Shaft axial play	± 0,1 mm
Shaft eccentricity (plus radial play)	± 0,04 mm
Fixing torque for grub screws	40 cNm (57 Ozin) max
Weight	50 g (1,76 oz)

MAIN FEATURES

∅ 36 mm encoder series recommended in feedback control systems on AC servomotors, interchangeable with size 15 Resolver in the back of the motor.

- 6 channels encoder with optical generation of "Hall effect phases" (commutation signals)
- Signal transmission by bit parallel bus
- Easy mechanical mounting
- Small dimensions
- Wide range of resolutions available
- High temperature resistance

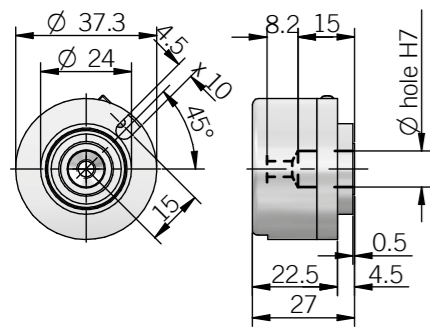


ORDERING CODE

EF 36K 4 L 512 S 5 L 8 X 6 PR .XXX

SERIES	incremental encoder with Hall phases EF
MODEL	blind hollow shaft with rear fixing 36K
MOTOR POLES	4 poles (2 poles pair) 4 6 poles (3 poles pair) 6 8 poles (4 poles pair) 8
ELECTRICAL INTERFACE FOR COMMUTATION SIGNALS	NPN open collector C line driver RS-422 L
INCREMENTAL RESOLUTION	ppr from 500 to 1024 see table for pulses availability
ZERO PULSE	without zero pulse S with zero pulse Z
POWER SUPPLY	5 V DC 5
ELECTRICAL INTERFACE FOR INCREMENTAL SIGNALS	line driver RS-422 L
BORE DIAMETER	mm 8 (3/8") 9,52 mm 9 mm 10
ENCLOSURE RATING	IP 40 X
MAX ROTATION SPEED	6000 rpm 6
OUTPUT TYPE	radial cable (standard length 0,3 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)
VARIANT	custom version XXX

36 K



for size 15 Resolver flange please refer to Accessories section
dimensions in mm

ELECTRICAL SPECIFICATIONS

Incremental resolution	from 500 to 1024 ppr
Power supply	4,5 ... 5,5 V DC
Current consumption without load	150 mA max
Max load current	20 mA / channel (line driver RS-422) 30 mA / channel (NPN open collector)
Output type for incremental signals	line driver RS-422 (AELT-5000 or equivalent)
Output type for Hall phases	NPN open collector (pull-up max +30V DC) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	150 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable
+V DC	red
0 V	black
Ch. A	green
Ch. B	yellow
Ch. Z	blue
Ch. A-	brown
Ch. B-	orange or pink
Ch. Z-	white
Ch. U	grey
Ch. V	violet
Ch. W	grey-pink
Ch. U-	red-blue
Ch. V-	white-green
Ch. W-	brown-green
⊕	shield

MECHANICAL SPECIFICATIONS

Bore diameter	ø 8 / 9,52 (3/8") / 10 mm
Enclosure rating	IP 40 (IEC 60529)
Max rotation speed	6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	5 G, 10 ... 500 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +85°C (+14° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for shaft fixing	1,5 Nm max
Weight	150 g (5,29 oz)

RESOLUTIONS

500 4 / 6 poles
512 4 / 6 poles
1000 6 / 8 poles
1024 4 / 6 / 8 poles
please directly contact our offices for other pulses

MAIN FEATURES

Miniaturized encoder series for general factory automation applications, small AC motors and gearmotors.

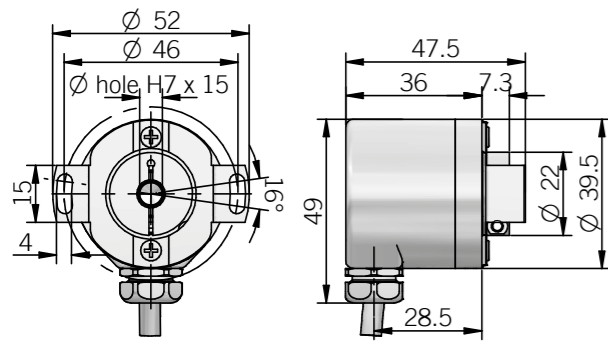
- 3 channel encoder (A / B / Z) up to 14400 ppr
- Power supply up to +30 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable output, connector available on cable end
- Metal cover for high IP enclosure rating
- Blind hollow shaft diameter up to 10 mm
- Mounting by stator coupling or torque pin



ORDERING CODE

ER	38F	500	S	5/30	P	10	X	X	PR	.XXX
SERIES incremental encoder series EM incremental encoder series ER										
MODEL blind hollow shaft with stator coupling 38F blind hollow shaft with torque pin 38G										
RESOLUTION ppr from 1 ... 14400 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 30 V DC 5/30										
ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/30V - output RS-422 RS										
BORE DIAMETER mm 6 mm 8 mm 10										
ENCLOSURE RATING IP 65 X										
OPTION to be reported X										
OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

38 F



dimensions in mm

ELECTRICAL SPECIFICATIONS

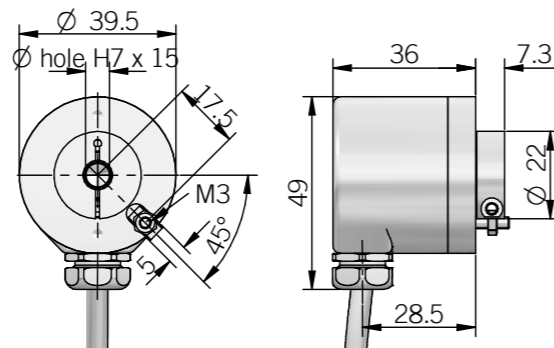
Sensing principle	magnetic Asic (EM) / reflective OptoAsic (ER)
Resolution	from 1 to 14400 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/30 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	5 = 200 mW typical 5/30 = 800 mW typical
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 3600 ppr / 500 kHz from 4000 ppr
Counting direction	A leads B clockwise (shaft view)
Startup time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⏏	shield	shield

38 G



torque pin is included, for mounting instruction please refer to product installation notes

MECHANICAL SPECIFICATIONS

Bore diameter	Ø 6* / 8* / 10 mm * with supplied adapter shaft
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	6000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,8 x 10 ⁻⁶ kgm ² (19 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-25° ... +85°C (-13° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for collar clamping	0,6 Nm (85 Ozin) recommended
Weight	150 g (5,29 oz)

EM SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 6 - 10 - 15 - 16 - 20 - 30 - 32 - 40 - 50 - 70 - 80 - 90

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - **360** - 400 - 480 - **500** - **512** - 600 - 625 - 720 - 800 - 900 - **1000** - **1024** - 1200 - 1250 - 1440 - 1600 - 1800 - **2000** - **2048** - **2500** - 3000 - **3600** - 4000 - 4096 - **5000** - 6000 - **7200** - 8000 - 8192 - 10000 - 12000 - 14400
please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Hollow shaft Ø 48 mm encoder series recommended for motor feedback.

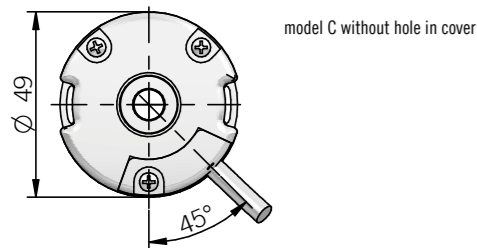
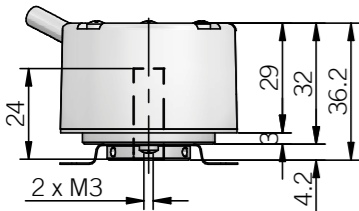
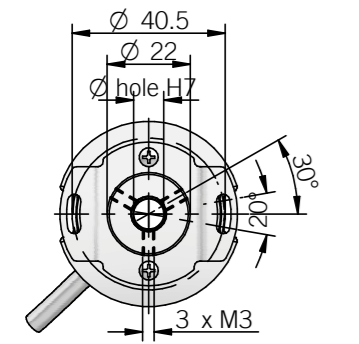
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 150 kHz output frequency
- Cable output, connector available on cable end
- Through hollow shaft diameter up to 8 mm
- Mounting by stator coupling



ORDERING CODE

EL	48C	500	S	5	L	8	X	6	PR	.XXX
SERIES incremental encoder series EL										
MODEL blind hollow shaft 48C through hollow shaft 48P										
RESOLUTION ppr from 100 to 2048 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24										
ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L										
BORE DIAMETER mm 6 mm 8										
ENCLOSURE RATING IP 40 X										
MAX ROTATION SPEED 6000 rpm 6										
OUTPUT TYPE radial cable (standard length 0,3 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

48 C / P



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	100 mA max
Max load current	C / P = 30 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	150 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Bore diameter	ø 6 / 8 mm
Enclosure rating	IP 40 (IEC 60529)
Max rotation speed	6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 500 Hz (IEC 60068-2-6)
Moment of inertia	2,5 x 10 ⁻⁶ kgm ² (59 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA 66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85° C (-4° ... +185°F)
Storage temperature	-25° ... +85° C (-13° ... +185°F)
Weight	100 g (3,53 oz)

CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

RESOLUTIONS

100 - 200 - 360 - 400 - 500 - 512 - 1000 - 1024 - 2000 - 2048

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

ø 49 mm encoder recommended in feedback control systems on AC servomotors,

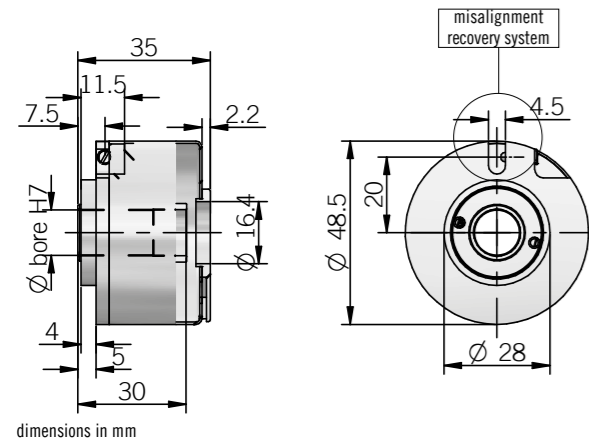
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 150 kHz output frequency
- Cable output, connector available on cable end
- Through hollow shaft diameter up to 12,7 mm (1/2")
- Interchangeable with size 19 Resolver



ORDERING CODE

EL	49C	500	S	5	L	8	X	6	PR	.XXX
SERIES incremental encoder EL										
MODEL blind hollow shaft 49C through hollow shaft 49P										
RESOLUTION ppr from 100 to 2048 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24										
ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L										
BORE DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 (1/2") mm 12,7										
ENCLOSURE RATING IP 40 X										
MAX ROTATION SPEED 6000 rpm 6										
OUTPUT TYPE radial cable (standard length 0,3 m) preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
										VARIANT custom version XXX

49 C / P



ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	100 mA max
Max load current	20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	150 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6 / 8 / 9,52 (3/8") / 10 / 12 / 12,7 (1/2") mm
Enclosure rating	IP 40 (IEC 60529)
Max rotation speed	6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	2 x 10 ⁻⁶ kgm ² (47 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	nickel plated brass
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85 °C (-4° ... +185°F) -10° ... +100°C (+14° ... +212°F) on demand
Storage temperature	-25° ... +85 °C (-13° ... +185°F)
Weight	150 g (5,29 oz)

RESOLUTIONS

100 - 200 - 500 - 512 - 1000 - 1024 - 2000 - 2048

please directly contact our offices for other pulses

MAIN FEATURES

∅ 49 mm encoder series recommended in feedback control systems on AC servomotors. They include a traditional incremental encoder and commutation signals (Hall effect phases).

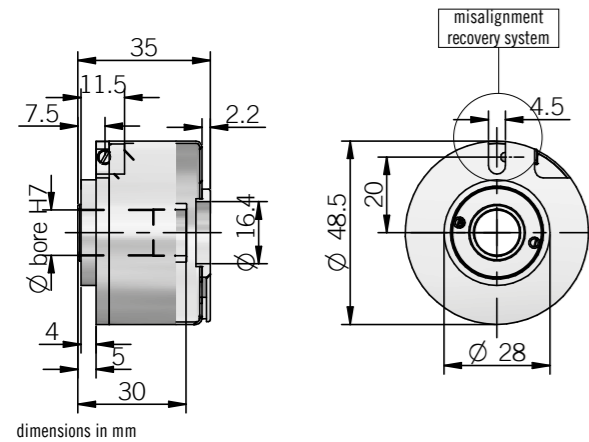
- Easy mechanical mounting
- Small dimensions
- Wide range of resolutions available
- High temperature resistance
- 6 channels encoder with optical generation of "Hall effect phases" (commutation signals)
- Signal transmission by bit parallel bus



ORDERING CODE EF 49C 6 L 500 S 5 L 8 X 6 PR .XXX

SERIES incremental encoder with Hall phases EF	MODEL blind hollow shaft 49C through hollow shaft 49P	MOTOR POLES 4 poles (2 poles pair) 4 6 poles (3 poles pair) 6 8 poles (4 poles pair) 8	ELECTRICAL INTERFACE FOR COMMUTATION SIGNALS NPN open collector C line driver RS-422 L	INCREMENTAL RESOLUTION ppr from 100 to 2048 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY 5 V DC 5	ELECTRICAL INTERFACE FOR INCREMENTAL SIGNALS line driver L	BORE DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 (1/2") mm 12,7	ENCLOSURE RATING IP 40 X	MAX ROTATION SPEED 6000 rpm 6	OUTPUT TYPE radial cable (standard length 0,3 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	VARIANT custom version XXX
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49 C / P



ELECTRICAL SPECIFICATIONS

Incremental resolution	from 100 to 2048 ppr
Power supply	4,5 ... 5,5 V DC
Current consumption without load	150 mA max
Max load current	20 mA / channel
Output type for incremental signals*	line driver RS-422 (AELT-5000 or equivalent)
Output type for Hall phases*	NPN open collector (pull-up max +30V DC) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	150 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable
+V DC	red
0 V	black
Ch. A	green
Ch. B	yellow
Ch. Z	blue
Ch. A-	brown
Ch. B-	orange or pink
Ch. Z-	white
Ch. U	grey
Ch. V	violet
Ch. W	grey-pink
Ch. U-	red-blue
Ch. V-	white-green
Ch. W-	brown-green
⊕	shield

MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6 / 8 / 9,52 / 10 / 12 / 12,7 mm
Enclosure rating	IP 40 (IEC 60529)
Max rotation speed	6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	5 G, 10 ... 500 Hz (IEC 60068-2-6)
Moment of inertia	2 x 10 ⁻⁶ kgm ² (47 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	nickel plated brass
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85 °C (-4° ... +185°F) -10° ... +100°C (+14° ... +212°F) on demand
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	150 g (5,29 oz)

RESOLUTIONS

100 4 / 6 poles
200 4 / 6 poles
500 4 / 6 / 8 poles
512 4 / 6 / 8 poles
1000 4 / 6 / 8 poles
1024 4 / 6 / 8 poles
2000 4 / 6 / 8 poles
2048 4 / 6 / 8 poles

please directly contact our offices for other pulses

MAIN FEATURES

∅ 50 mm encoder recommended for motor feedback. Suitable for small size motors due to its compact dimensions.

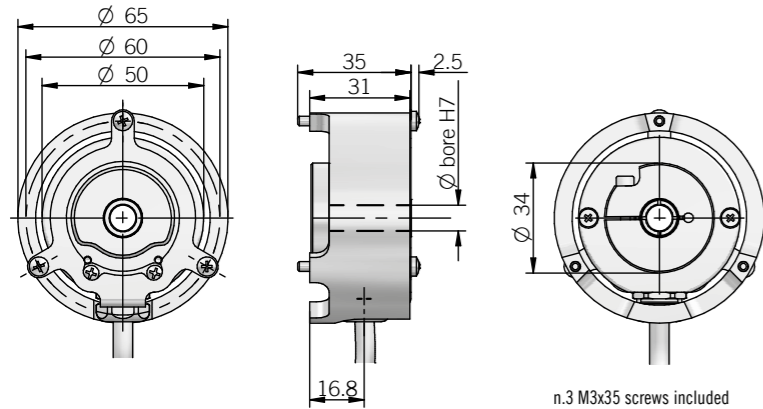
- 3 channel encoder (A / B / Z) up to 1024 ppr
- Highly integrated optical ASIC
- Wide power supply up to +30 V DC
- Through hollow shaft up to 10 mm diameter
- Mounting by coupling flange or stator coupling (front or rear fixing)
- IP 65 as protection grade
- Wide temperature range -40 ... + 100°C



ORDERING CODE

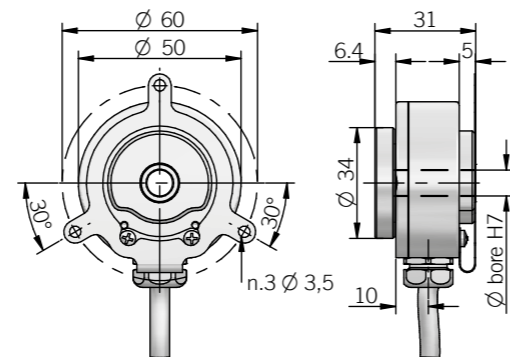
EH	50FP	1024	S	5/30	P	6	X	6	PR	.XXX
SERIES incremental encoder series EH										
MODEL through hollow shaft with front fixing 50FA through hollow shaft with rear fixing 50FP										
RESOLUTION ppr from 100 to 1024 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY 5 ... 30 V DC 5/30										
ELECTRICAL INTERFACE push-pull P line driver L power supply 5/30V - output RS-422 RS										
BORE DIAMETER mm 6 mm 8 9,52 mm (3/8") 9 10 mm 10										
ENCLOSURE RATING IP 65 X										
MAX ROTATION SPEED 6000 rpm 6										
OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

50 FA



dimensions in mm

50 FP



ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 1024 ppr
Power supply	4,5 ... 30 V DC (with reverse polarity protection)
Power draw without load	800 mW max
Max load current	20 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	grey or brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-40° ... +100 °C (-40° ... +212°F)
Storage temperature	-40° ... +100 °C (-40° ... +212°F)
Fixing torque for collar clamping	1 Nm (142 Ozin) recommended
Weight	150 g (5,29 oz) mod.FP 200 g (7,05 oz) mod.FA

RESOLUTIONS

100 - 200 - 256 - 360 - 400 - 500 - 1000 - 1024 ppr

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Encoder series for direct mounting on motors; integrated elastic coupling allows radial and axial shaft play.

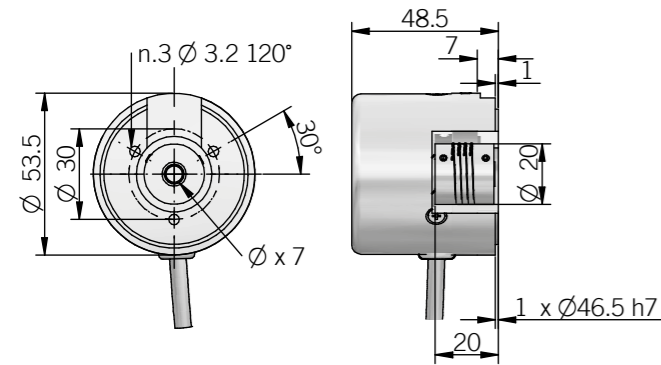
- 3 channel encoder (A / B / Z) up to 1024 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 150 kHz output frequency
- Cable output, connector available on cable end
- Up to 10 mm bore diameter
- Integrated elastic couplig



ORDERING CODE

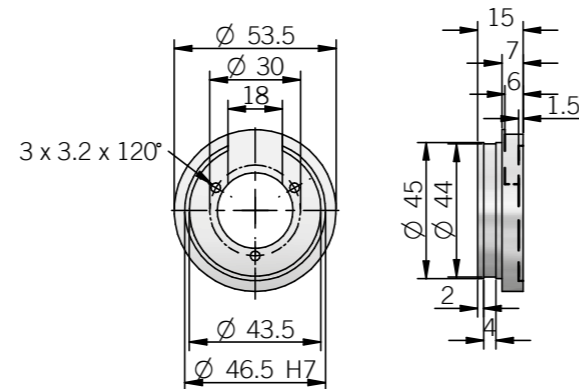
EH	53A	500	S	8/24	P	8	X	6	PR.N	XXX
SERIES incremental encoder series EH										
MODEL adjustable flange model 53A adjustable flange model 53B										
RESOLUTION ppr from 50 to 1024 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24										
ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L										
BORE DIAMETER mm 6 mm 8 mm 10										
ENCLOSURE RATING IP 54 X										
MAX ROTATION SPEED 6000 rpm 6										
OUTPUT TYPE radial cable (standard length 0,5 m) PR.N preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

53 A



dimensions in mm

53 B flange



ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 1024 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	150 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter	Ø 6 / 8 / 10 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	6000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1 x 10 ⁻⁶ kgm ² (24 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PAG6 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	150 g (5,29 oz)

RESOLUTIONS

50 - 100 - 120 - 125 - 128 - 150 - 180 - 200 - 250 - 256 - 300 - 360 - 400 - 500 - 512 - 600 - 720 - 1000 - 1024

please directly contact our offices for other pulses

MAIN FEATURES

Encoder series for direct mounting on motors; integrated elastic coupling allows radial and axial shaft play.

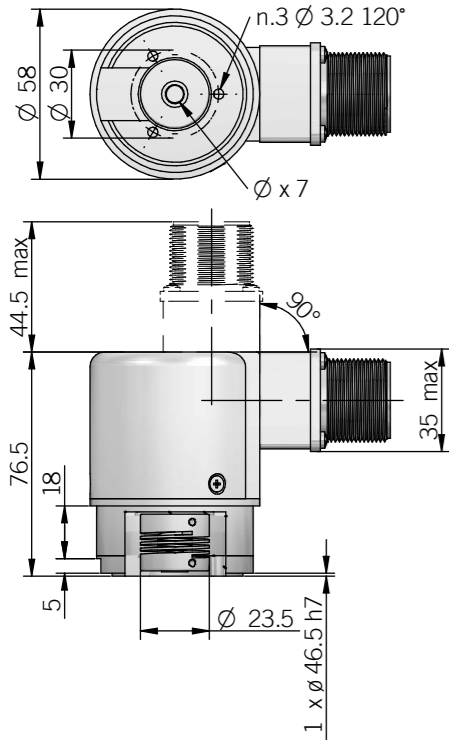
- 3 channel encoder (A / B / Z) up to 10000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Available with metal cover for heavy duty applications
- Integrated elastic couplig up to 10 mm bore diameter



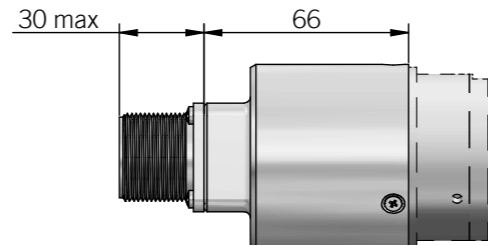
ORDERING CODE ER 53A M* 500 S 5/28 P 8 X 6 P R XXX

SERIES incremental encoder series EL incremental encoder series ER	MODEL adjustable flange model 53A adjustable flange model 53B	METAL COVER * add for metal cover M	RESOLUTION ppr from 1 to 10000 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	BORE DIAMETER mm 6 mm 8 mm 10	ENCLOSURE RATING IP 54 X IP 64 S	MAX ROTATION SPEED (IP 64) 3000 rpm 3 (IP 54) 6000 rpm 6	OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J M12 connector M12 M23 connector H IP40 IEC 60130-9 connector C female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX
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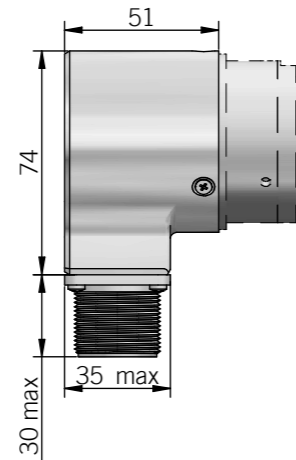
53 A



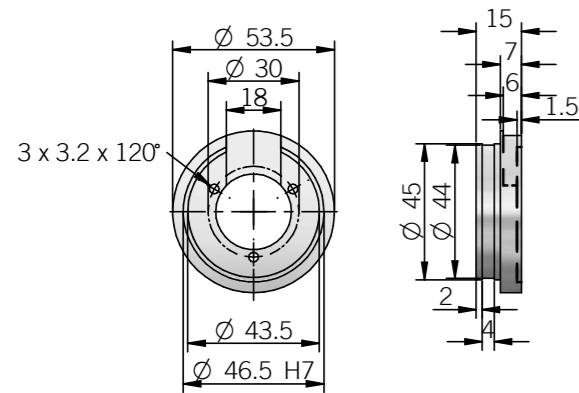
Dimensions with metal cover and axial output



Dimensions with metal cover and radial output



53 B flange



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 10000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 160 - 180 - 350 - 450 - 660 - 700 - 750 - 1500

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - 360 - 400 - 480 - 500 - 512 - 600 - 625 - 720 - 800 - 900 - 1000 - 1024 - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 9000 - 10000

please directly contact our offices for other pulses, preferred resolutions in bold

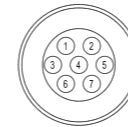
MECHANICAL SPECIFICATIONS

Bore diameter	ø 6 / 8 / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 64 (IEC 60529)
Max rotation speed	IP 64 - 3000 rpm IP 54 - 6000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1 x 10 ⁻⁶ kgm ² (24 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	350 g (12,35 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
≡	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

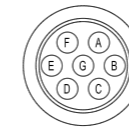
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



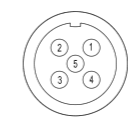
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



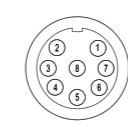
M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



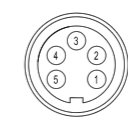
M12 connector (5 pin)
M12 A coded
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



C connector (5 pin)
IEC 60130-9
solder side view FV



C connector (8 pin)
IEC 60130-9
solder side view FV



H connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



MAIN FEATURES

Hollow shaft encoder series for industrial applications with high mechanical resistance requirements. These encoders are designed to withstand high radial and axial shaft loads.

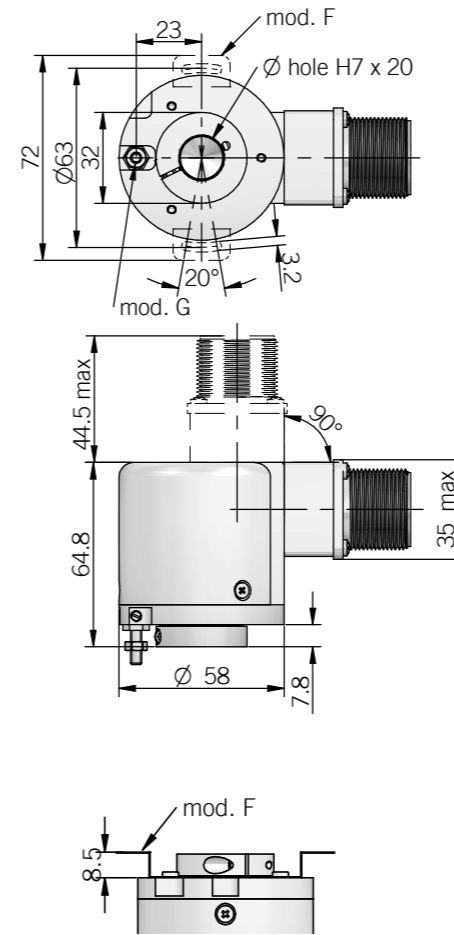
- 3 channel encoder (A / B / Z) up to 24000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Available with metal cover for heavy duty applications
- Blind hollow shaft diameter up to 15 mm
- Mounting by stator coupling, spring or torque pin



ORDERING CODE ER 58G M* 500 S 5/28 P 8 X 3 P R .XXX

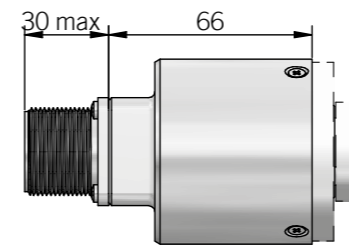
SERIES incremental encoder series EL incremental encoder series ER	MODEL blind hollow shaft with stator coupling 58F blind hollow shaft with torque pin 58G blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G	METAL COVER * add for metal cover M	RESOLUTION ppr from 1 to 24000 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	BORE DIAMETER mm 8 mm 10 mm 12 mm 14 mm 15	ENCLOSURE RATING IP 54 X IP 66 S	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J M12 connector M12 M23 connector H IP40 IEC 60130-9 connector C female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX
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58 F / G



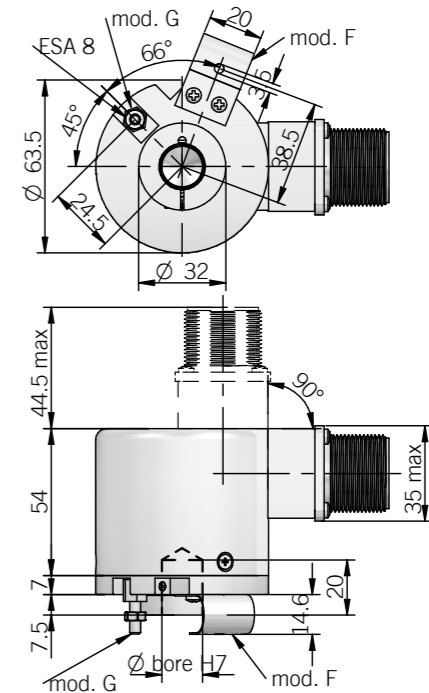
torque pin is included in model G, for mounting instruction please refer to product installation notes

Dimensions with metal cover and axial output

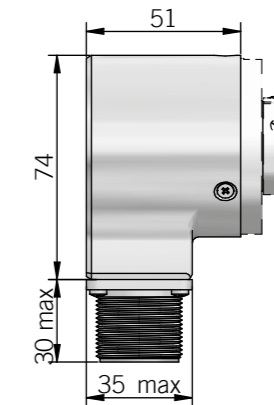


dimensions in mm

63 F / G



Dimensions with metal cover and radial output



ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 2500 ppr (58 G) from 1 to 24000 ppr (58 F - 63 F / G)
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 160 - 180 - 350 - 450 - 660 - 700 - 750 - 1500

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - **360** - 400 - 480 - **500** - 512 - 600 - 625 - **720** - 800 - 900 - **1000** - **1024** - 1200 - 1250 - 1440 - 1600 - 1800 - **2000** - **2048** - **2500** - 3000 - **3600** - 4000 - 4096 - **5000** - 6000 - **7200** - 8000 - 8192 - 9000 - **10000** - 10240 - 12000 - **14400** - 16000 - 16384 - 18000 - **20000** - 20480 - 24000

please directly contact our offices for other pulses, preferred resolutions in bold

CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
≡	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

<p>J connector (7 pin) JIS-C-5432 Size 16 solder side view FV</p>	<p>M connector (7 pin) Amphenol MS3102-E-16-S solder side view FV</p>	<p>M12 connector (5 pin) M12 A coded solder side view FV</p>	<p>C connector (5 pin) IEC 60130-9 solder side view FV</p>	<p>H connector (12 pin) - M23 CCW Hummel 7.410.000000 - 7.002.912.603 solder side view FV</p>
<p>J connector (10 pin) JIS-C-5432 Size 16 solder side view FV</p>	<p>M connector (10 pin) Amphenol MS3102-E-18-1 solder side view FV</p>	<p>M12 connector (8 pin) M12 A coded solder side view FV</p>	<p>C connector (8 pin) IEC 60130-9 solder side view FV</p>	

MECHANICAL SPECIFICATIONS

Bore diameter	ø 8* / 10* / 12* / 14 / 15 mm * with supplied adapter shaft (valid for resolutions ≥ 3000 ppr)
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -20° ... +70°C (-4° ... +158°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	350 g (12,35 oz)

MAIN FEATURES

Hollow shaft encoder series for small AC motors, thanks to compact size (only 35mm height).

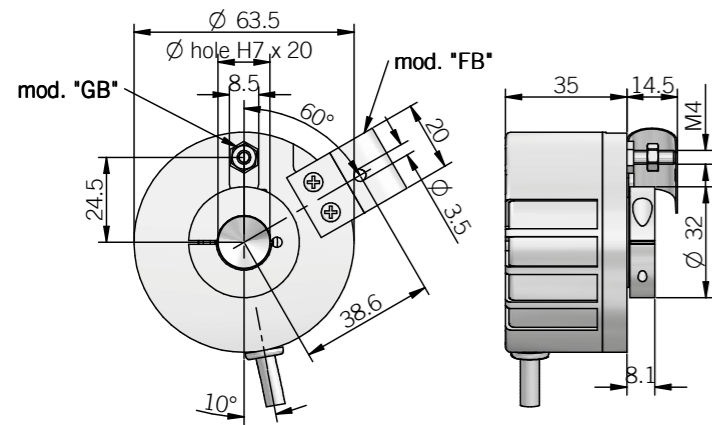
- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 300 kHz output frequency
- Cable output, connector available on cable end
- Through or blind hollow shaft diameter up to 15 mm
- Shaft fixing by collar clamping



ORDERING CODE

EL	63GB	500	S	5/28	P	8	X	3	PR	.XXX	
<p>SERIES incremental encoder EL</p> <p>MODEL blind hollow shaft with spring 63FB blind hollow shaft with torque pin 63GB through hollow shaft with torque pin 63PB through hollow shaft with spring 63PBF rear fixing shaft with torque pin 63PC rear fixing shaft with spring 63PCF</p> <p>RESOLUTION ppr from 1 to 2500 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS</p> <p>BORE DIAMETER mm 8 mm 10 mm 12 mm 14 mm 15</p> <p>ENCLOSURE RATING IP 54 X</p> <p>MAX ROTATION SPEED 3000 rpm 3</p> <p>OUTPUT TYPE radial cable (standard length 1,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)</p> <p>VARIANT custom version XXX</p>											

63 FB / GB

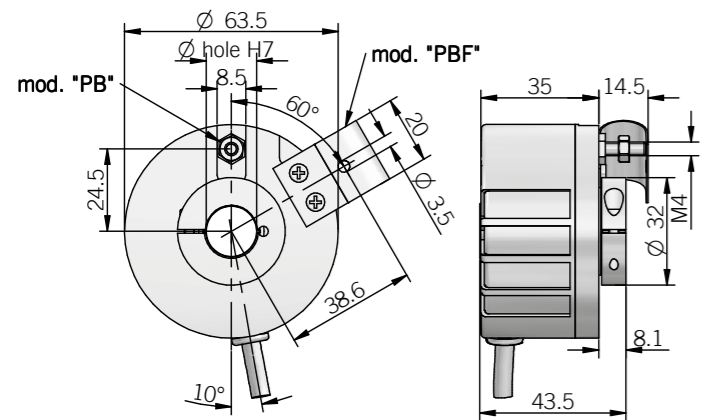


ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 2500 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	300 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

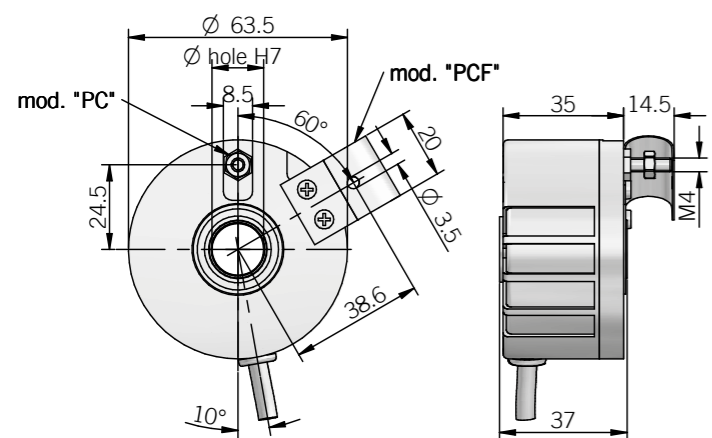
63 PB / PBF



MECHANICAL SPECIFICATIONS

Bore diameter	Ø 8 / 10 / 12 / 14 / 15 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,04 Nm (5,66 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA 66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60 °C (+14° ... +140°F)
Storage temperature	-25° ... +70 °C (-13° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	350 g (12,35 oz)

63 PC / PCF



CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

RESOLUTIONS

1 - 2 - 5 - 20 - 25 - 32 - 50 - 60 - 100 - 128 - 200 - 250 - 256 - 360 - 400 - 500 - 512 - 600 - 720 - 1000 - 1024 - 1440 - 1800 - 2000 - 2048 - 2500

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Standard encoder series for industrial environments with high mechanical resistance requirements. Specifically designed for direct mounting on motors or tachometric dynamos thanks to integrated elastic coupling which allows radial and / or axial motor shaft play.

- 3 channel encoder (A / B / Z) up to 24000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Cable or connector output
- Available with metal cover for heavy duty applications
- Integrated elastic couplig up to 10 mm bore diameter
- Encoder can be mounted on tachometric dynamo



ORDERING CODE ER 721 A M* 500 S 5/28 P 8 X 6 P R .XXX

SERIES
incremental encoder series EL
incremental encoder series ER

MODEL
fixing holes Ø 63,5 mm 721
fixing holes Ø 65 mm 722
fixing holes Ø 57 mm 723
fixing holes Ø 60 mm 724

FLANGE TYPE
flange type A
flange type B

METAL COVER
* add for metal cover M

RESOLUTION
ppr from 1 to 24000
see table for pulses availability

ZERO PULSE
without zero pulse S
with zero pulse Z

POWER SUPPLY
(with L electrical interface) 5 V DC 5
5 ... 28 V DC 5/28

ELECTRICAL INTERFACE
NPN open collector C
push-pull P
line driver L
power supply 5/28V - output RS-422 RS

BORE DIAMETER
mm 6
mm 8
mm 10

ENCLOSURE RATING
IP 54 X
(mod. EL721 / EL722) IP 66 S

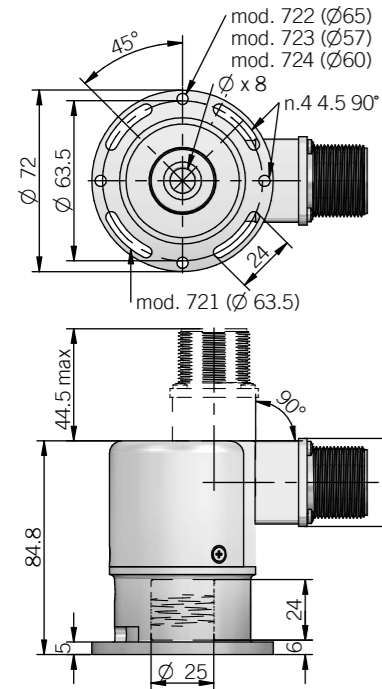
MAX ROTATION SPEED
(IP 66) 3000 rpm 3
(IP 54) 6000 rpm 6

OUTPUT TYPE
cable (standard length 1,5 m) P
preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)
MIL connector M
JIS-C-5432 connector J
M12 connector M12
M23 connector H
IP40 IEC 60130-9 connector C
female connector included, without female please add 162 as variant code

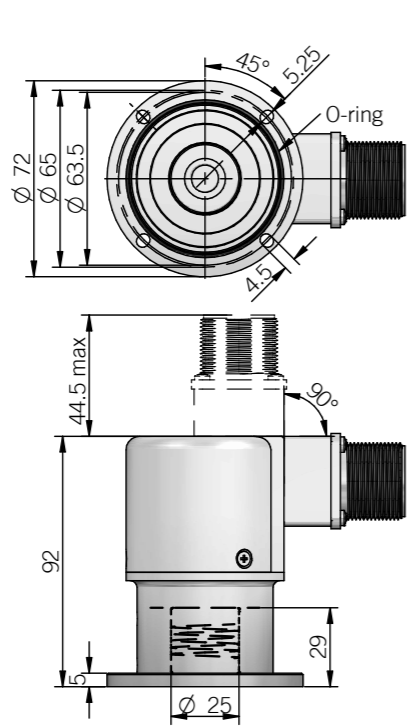
DIRECTION TYPE
axial A
radial R

VARIANT
custom version XXX

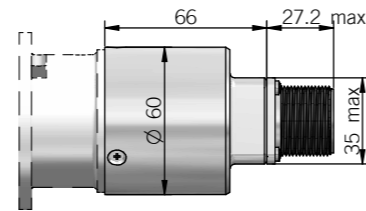
721 A



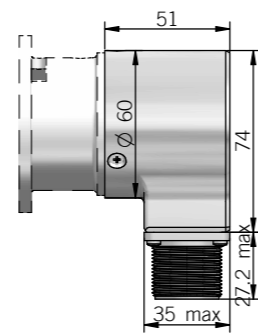
721 A IP 66



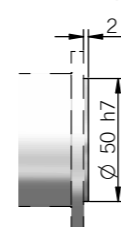
Dimensions with metal cover axial output



Dimensions with metal cover radial output



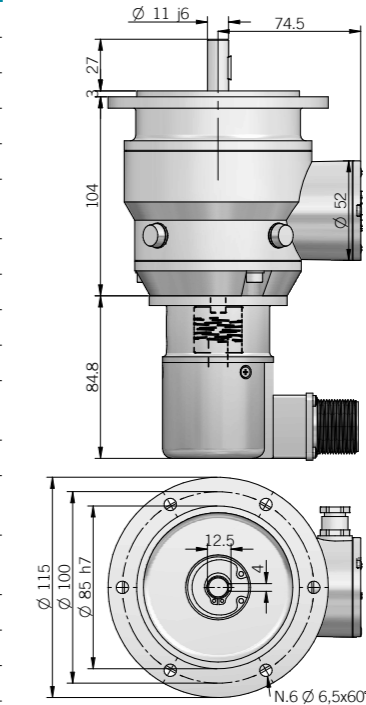
72 B flange version



TECHNICAL SPECIFICATIONS FOR TACHOMETRIC DYNAMO

Peak to peak ripple	≤ 1 %	
Effective value ripple	≤ 0,4 %	
Linearity error	≤ 0,2 %	
Reversibility error	± 0,1 %	
Voltage tolerance	± 3 %	
Voltage variation with temperature	-0,02 % / °C	
Insulation class	B	
N. of poles	4	
N. of slots	33	
N. of laminas	33	
Field excitation by magnets	Alnico	
Winding	60 V / 1000 rpm	20 V / 1000 rpm
Nominal voltage at 1000 rpm	60 V	20 V
Load - free voltage at 1000 rpm	61,2 V	20,3 V
Max current admitted	70 mA	200 mA
Nom. current	5 mA	10 mA
Max speed	5000 rpm	6000 rpm
Armature resistance at 25°C	240 Ω	26 Ω
Electric time constant	0,7 ms	0,7 ms
Enclosure rating	IP 55 (IEC 60529)	
Weight	2,35 Kg (82,89 oz)	
Moment of inertia	2 x 10 ⁻⁶ kgm ² (47 x 10 ⁻⁶ lbf ²)	

Application with tachometric dynamo



dimensions in mm

dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 24000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EL SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 100* - 160 - 180 - 240* - 250* - 350 - 450 - 500* - 660 - 700 - 750 - 900* - 1000* - 1024* - 1250* - 1300* - 1500 - 1800* - 2000* - 2048* - 2500*

* only with model EL721 / EL722 with "S" enclosure rating

ER SERIES RESOLUTIONS

100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - 360 - 400 - 480 - 500 - 512 - 600 - 625 - 720 - 800 - 900 - 1000 - 1024 - 1200 - 1250 - 1440 - 1600 - 1800 - 2000 - 2048 - 2500 - 3000 - 3600 - 4000 - 4096 - 5000 - 6000 - 7200 - 8000 - 8192 - 9000 - 10000 - 10240 - 12000 - 14400 - 16000 - 16384 - 18000 - 20000 - 20480 - 24000

please directly contact our offices for other pulses, preferred resolutions in bold

MECHANICAL SPECIFICATIONS

Bore diameter	φ 6 / 8 / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - EL 3000 rpm / 60° C ER 3000 rpm / 70° C - 2000 rpm / 85° C
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	3,5 x 10 ⁻⁶ kgm ² (83 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,04 Nm (5,66 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced / painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F) EL series -25° ... +85°C (-13° ... +185°F) ER series
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	400 g (14,11 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
⊖	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

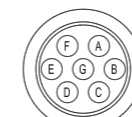
J connector (7 pin) JIS-C-5432 Size 16 solder side view FV



J connector (10 pin) JIS-C-5432 Size 16 solder side view FV



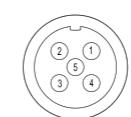
M connector (7 pin) Amphenol MS3102-E-16-S solder side view FV



M connector (10 pin) Amphenol MS3102-E-18-1 solder side view FV



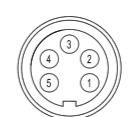
M12 connector (5 pin) M12 A coded solder side view FV



M12 connector (8 pin) M12 A coded solder side view FV



C connector (5 pin) IEC 60130-9 solder side view FV



C connector (8 pin) IEC 60130-9 solder side view FV



H connector (12 pin) - M23 CCW Hummel 7.410.000000 - 7.002.912.603 solder side view FV



MAIN FEATURES

∅ 80 mm encoder series recommended in feedback control systems on AC servomotors.

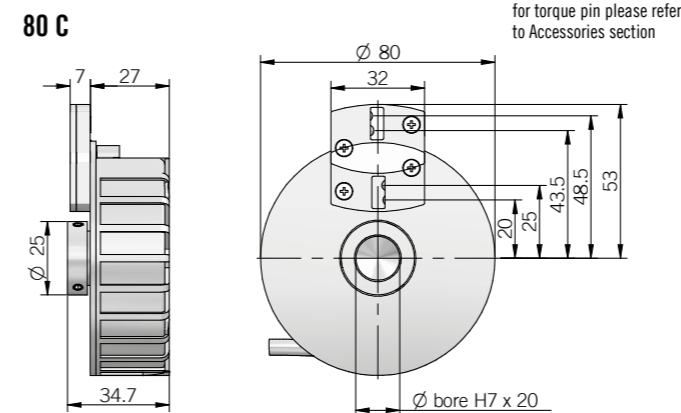
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +30 V DC with several electric interfaces available
- Up to 105 kHz output frequency
- Cable output, connector available on cable end
- Through or blind hollow shaft diameter up to 15 mm
- Shaft fixing by grain or collar clamping



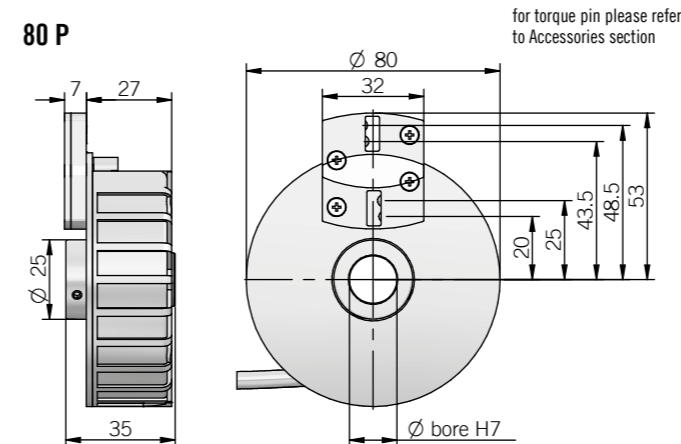
ORDERING CODE

EH80	C	500	S	5	L	8	X	6	PR	.XXX
SERIES incremental encoder EH80	MODEL blind hollow shaft C through hollow shaft P through hollow shaft with collar clamping PG blind hollow shaft with rear fixing K	RESOLUTION ppr from 1 to 2048 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	BORE DIAMETER (mod. C - P) mm 8 mm 10 (mod. C - P) mm 12 (mod. C - P - PG) mm 14 (mod. C - P - PG) mm 15	ENCLOSURE RATING IP 54 X	MAX ROTATION SPEED (mod. P - PG) 3000 rpm 3 (mod. C - K) 6000 rpm 6	OUTPUT TYPE radial (standard length 0,3 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	VARIANT custom version XXX

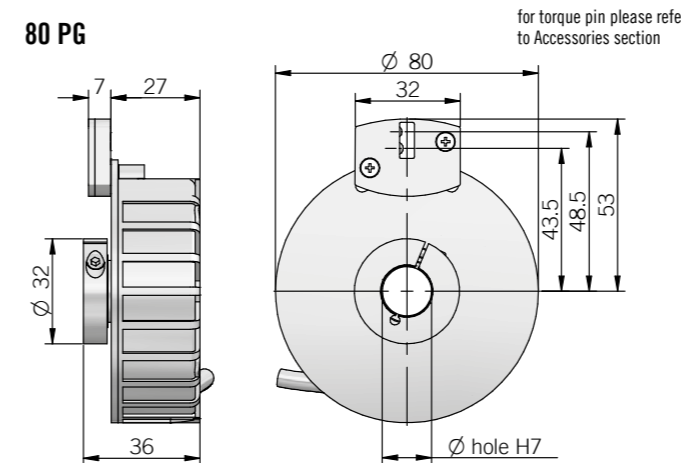
80 C



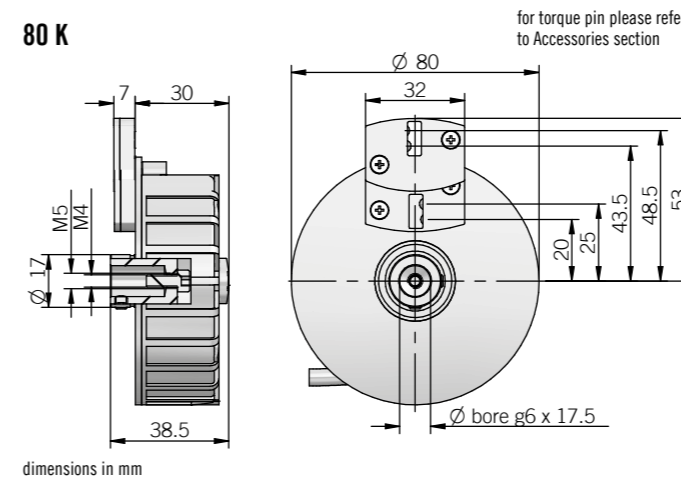
80 P



80 PG



80 K



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Bore diameter	∅ 8 / 10 / 12 / 14 / 15 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm (mod.P / PG) 6000 rpm (mod.C / K)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbfm ²)
Starting torque (at +20°C / +68°F)	< 0,04 Nm (5,66 Ozin)
Bearing stage material	PA66 glass fiber reinforced
Shaft material	EN-AW 2011 aluminum (mod. C / K) 1.4305 / AISI 303 stainless steel (mod.P / PG)
Housing material	PA66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85 °C (-4° ... +185°F) -20° ... +100°C (-4° ... +212°F) on demand
Storage temperature	-25° ... +85 °C (-13° ... +185°F)
Fixing torque for grub screws	max 0,75 Nm (106 Ozin)
Fixing torque for collar clamping	1 Nm recommended (142 Ozin)
Weight	250 g (8,82 oz)

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 25 - 30 - 50 - 60 - 100* - 200 - 250 - 256 - 360 - 400 - 500 - 512 - 600 - 1000 - 1024 - 2000 - 2048

*available only without zero pulse
please directly contact our offices for other pulses, preferred resolutions in bold

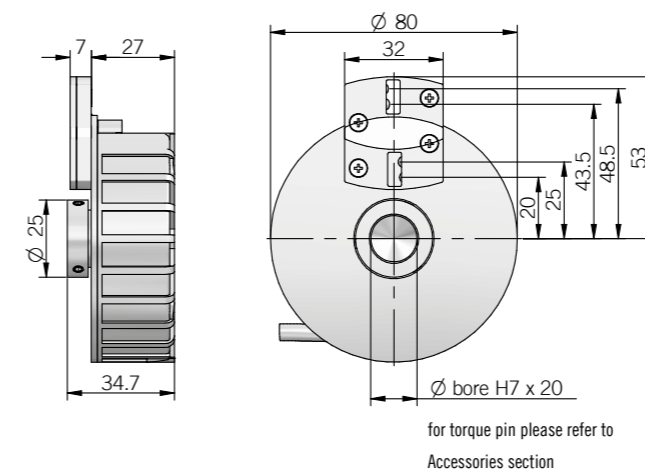
MAIN FEATURES

ø 80 mm encoder series recommended in feedback control systems on AC servomotors. They include a traditional incremental encoder and commutation signals (Hall effect phases).

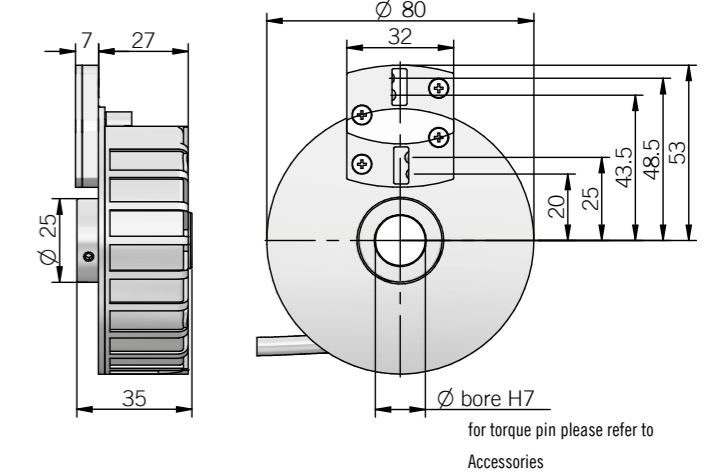
- Easy mechanical mounting
- Small dimensions
- Wide range of resolutions available
- High temperature resistance
- 6 channels encoder with optical generation of "Hall effect phases" (commutation signals)
- Signal transmission by bit parallel bus



EF 80 C



EF 80 P



dimensions in mm

ORDERING CODE EF80 C 6 L 500 S 5 L 8 X 3 PR .XXX

SERIES incremental encoder with Hall phases EF80	MODEL blind hollow shaft C through hollow shaft P	MOTOR POLES 4 poles (2 poles pair) 4 6 poles (3 poles pair) 6 8 poles (4 poles pair) 8	ELECTRICAL INTERFACE FOR COMMUTATION SIGNALS NPN open collector C line driver RS-422 L	INCREMENTAL RESOLUTION ppr from 200 to 2048 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY 5 V DC 5	ELECTRICAL INTERFACE FOR INCREMENTAL SIGNALS line driver RS-422 L	BORE DIAMETER mm 8 mm 10 mm 14 mm 15	ENCLOSURE RATING IP 54 X	MAX ROTATION SPEED (mod. P) 3000 rpm 3 (mod. C) 6000 rpm 6	OUTPUT TYPE radial (standard length 0,3 m) PR preferred cable lengths 1 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	VARIANT custom version XXX
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ELECTRICAL SPECIFICATIONS

Incremental resolution	from 200 to 2048 ppr
Power supply	4,5 ... 5,5 V DC
Current consumption without load	200 mA max
Max load current	20 mA / channel
Output type for incremental signals *	line driver RS-422 (AELT-5000 or equivalent)
Output type for Hall phases *	NPN open collector (pull-up max +30V DC) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable
+V DC	red
0 V	black
Ch. A	green
Ch. B	yellow
Ch. Z	blue
Ch. A-	brown
Ch. B-	orange or pink
Ch. Z-	white
Ch. U	grey
Ch. V	violet
Ch. W	grey-pink
Ch. U-	red-blue
Ch. V-	white-green
Ch. W-	brown-green
≡	shield

MECHANICAL SPECIFICATIONS

Bore diameter	ø 8 / 10 / 14 / 15 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm (mod.P) 6000 rpm (mod.C)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,04 Nm (5,66 Ozin)
Bearing stage material	PA66 glass fiber reinforced
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA66 glass fiber reinforced
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85 °C (-4° ... +185°F)
Storage temperature	-25° ... +85 °C (-13° ... +185°F)
Fixing torque for grub screws	max 0,75 Nm (106 Ozin)
Weight	250 g (8,82 oz)

RESOLUTIONS

200 6 poles	1000 4 / 6 poles
250 6 poles	1024 4 / 6 / 8 poles
500 4 / 6 / 8 poles	2000 6 poles
512 6 poles	2048 6 poles

MAIN FEATURES

∅ 88 mm through hollow shaft encoder designed for middle size asynchronous motors.

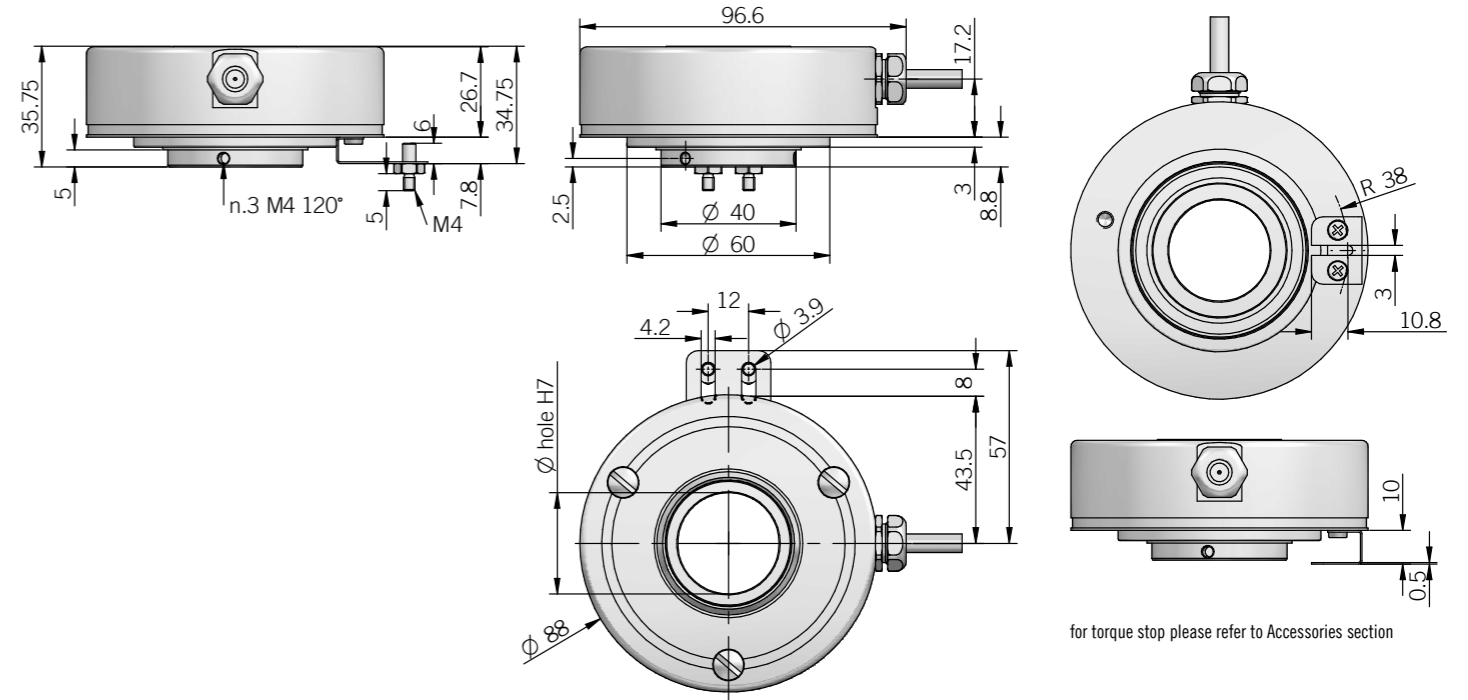
- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Cable output, connector available on cable end
- Sturdy mechanic
- 25 or 30 mm bore diameter, others on request
- Shaft fixing with grub screws



ORDERING CODE

EH	88P	1024	S	5/28	P	30	S	3	PR	.XXX
<p>SERIES incremental encoder series EH incremental encoder series EL</p> <p>MODEL through hollow shaft with spring 88P</p> <p>RESOLUTION (mod. EH) max ppr 2500 (mod. EL) max ppr 2048 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 (with L electrical interface) 8 ... 24 V DC 8/24 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L (mod. EH) power supply 5/28V - output RS-422 RS</p> <p>SHAFT DIAMETER mm 25 mm 30 please directly contact our offices for other diameters</p> <p>ENCLOSURE RATING IP 65 S</p> <p>MAX ROTATION SPEED 3000 rpm 3</p> <p>OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)</p> <p style="text-align: right;">VARIANT custom version XXX</p>										

88 P



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 250 to 2500 ppr (EH series) from 2 to 2048 ppr (EL series)
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,75 ... 29,4 V DC 8/24 = 7,6 ... 25,2 (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (pullup max +30V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 25 / 30 mm
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	45 x 10 ⁻⁶ kgm ² (10,68 x 10 ⁻⁴ lbfm ²)
Starting torque (at +20°C / +68°F)	< 0,1 Nm (14,16 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +70°C (+14° ... +158°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for grub screws	max 0,75 Nm (106 Ozin)
Weight	350 g (12,35 oz)

EH SERIES RESOLUTIONS

250 - 256 - 500 - **512** - 700 - 720 - **1000** - **1024** - 1440 - 2500

EL SERIES RESOLUTIONS

2 - 5 - 90 - 100 - 200 - **360** - 400 - 600 - 900 - **2000** - 2048

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

Cost effective encoder for asynchronous motors, suitable for elevators and stage machinery.

- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Cable output, connector available on cable end
- Sturdy mechanic
- Up to 40 mm bore diameter
- Shaft fixing by collar clamping

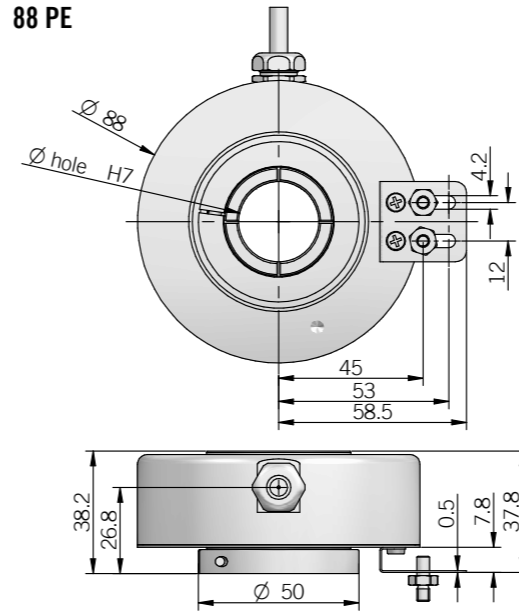


ORDERING CODE

EH 88PE 1024 S 5/28 P 30 X 3 PR .XXX

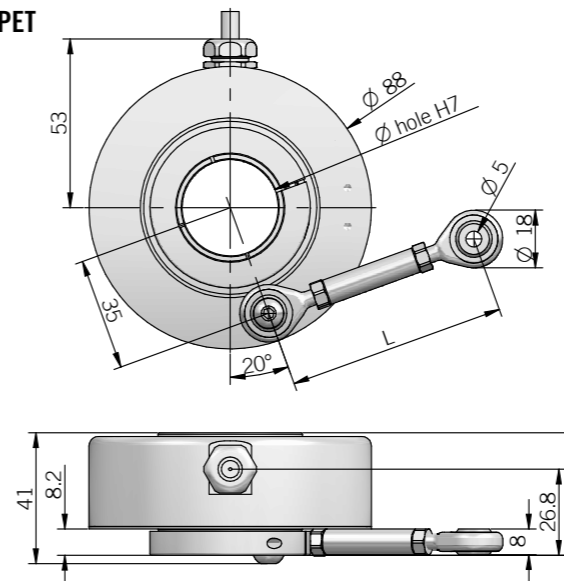
SERIES incremental encoder series EH	MODEL through hollow shaft with spring 88PE through hollow shaft for torque arm fixing 88PET please refer to Accessories section for torque arm	RESOLUTION ppr from 500 to 2500 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28V - output RS-422 RS	BORE DIAMETER mm 25 mm 30 (mod. PE) mm 35 (mod. PE) mm 38 (mod. PE) mm 40	ENCLOSURE RATING IP 54 X	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	VARIANT custom version XXX
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88 PE



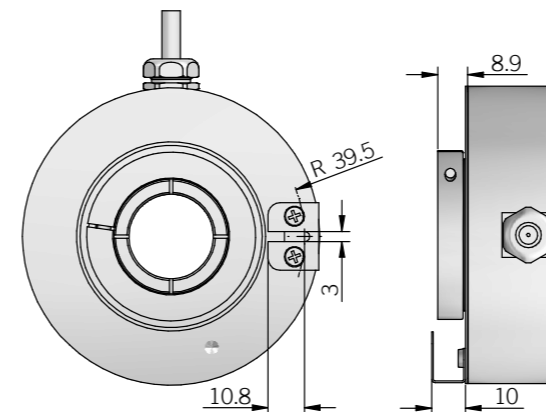
for torque pin please refer to Accessories section

88 PET



torque arm not included, please refer to Accessories section

OPTIONAL TORQUE STOP



dimensions in mm

for torque stop please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	from 500 to 2500 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW
Max load current	20 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Bore diameter	Ø 25 / 30 / 35 / 38 / 40 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	45 x 10 ⁻⁶ kgm ² (10,68 x 10 ⁻⁴ lbfm ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	up to Ø 38 mm: EN-AW 2011 aluminum Ø 40 mm: 1.4305/AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-30° ... +85°C (-22° ... +185°F)
Storage temperature	-30° ... +85°C (-22° ... +185°F)
Fixing torque for collar clamping	1 Nm recommended (142 Ozin)
Weight	350 g (12,35 oz)

RESOLUTIONS

500 - 512 - 720 - 1000 - 1024 - 1440 - 2500

please directly contact our offices for other pulses, preferred resolutions in bold

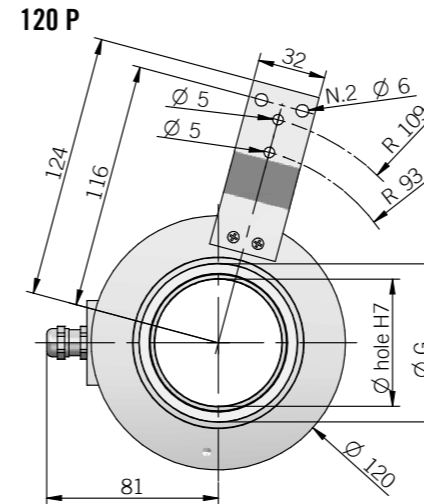
CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

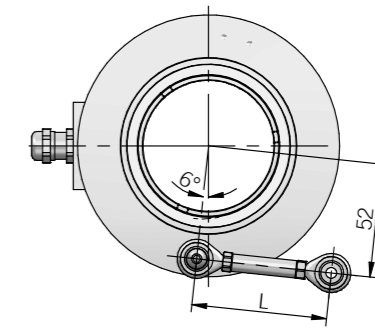
MAIN FEATURES

∅ 120 mm through hollow shaft encoder designed for medium / big size motors.

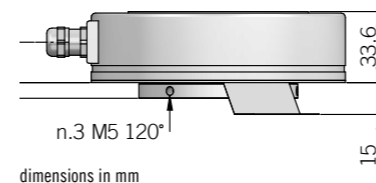
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Cable output, connector available on cable end
- Through hollow shaft diameter up to 60 mm
- Shaft fixing by grub screws



WITH TORQUE ARM



for torque arm please refer to Accessories section



dimensions in mm

ORDERING CODE

EL	120P	1024	S	5/28	P	50	X	3	PR	.XXX
SERIES	incremental encoder series EL									
MODEL	through hollow shaft with spring 120P									
RESOLUTION	ppr from 400 to 2048 see table for pulses availability									
ZERO PULSE	without zero pulse S with zero pulse Z									
POWER SUPPLY	(with L electrical interface) 5 V DC 5 (with L electrical interface) 8 ... 24 V DC 8/24 5 ... 28 V DC 5/28									
ELECTRICAL INTERFACE	NPN open collector C push-pull P line driver L									
BORE DIAMETER	mm 40 mm 50 mm 60									
ENCLOSURE RATING	IP 54 X									
MAX ROTATION SPEED	3000 rpm 3									
OUTPUT TYPE	radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)									
VARIANT	custom version XXX									

ELECTRICAL SPECIFICATIONS	
Resolution	from 400 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,75 ... 29,4 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pullup max +30V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS		
Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
≡	shield	shield

SHAFT DIAMETER	G
∅ 40	∅ 65
∅ 50	∅ 65
∅ 60	∅ 75

MECHANICAL SPECIFICATIONS	
Bore diameter	∅ 40 / 50 / 60 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	approx 215 x 10 ⁻⁶ kgm ² (51 x 10 ⁻⁴ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,05 Nm (7 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	EN-AW 2011 aluminum
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60 °C (+32° ... +140°F)
Storage temperature	-25° ... +70 °C (-13° ... +158°F)
Fixing torque for grub screws	max 0,75 Nm (106 Ozin)
Weight	750 g (26,46 oz)

RESOLUTIONS

400 - 800 - 1000 - 1024 - 1440 - 1600 - 2000 - 2048

please directly contact our offices for other pulses, preferred resolutions in bold

MAIN FEATURES

EMI series encoders are suitable for several application fields like electric motors marine industry, iron and steel industry, textile machines, wood-working, paper-working, glass working, marble-working machinery and, more generally, automation and process control fields.

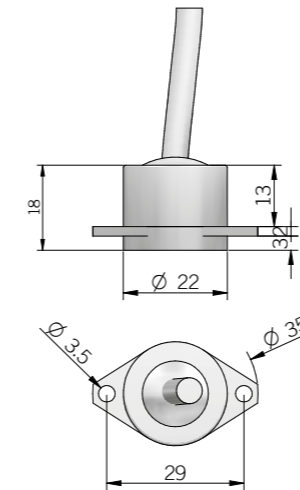
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Cable output, connector available on cable end
- Compact dimensions
- No wear due to no contact magnetic technology
- Bore shaft diameter up to 10 mm
- IP 67 enclosure rating
- Wide operating temperature -40° ... +125°C (-40° ... +257°F)



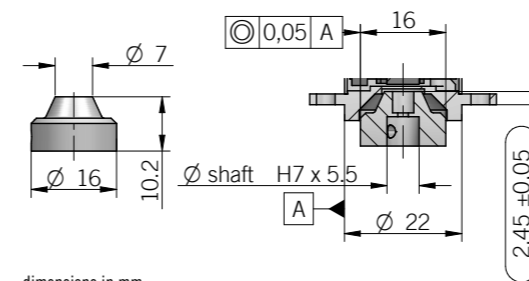
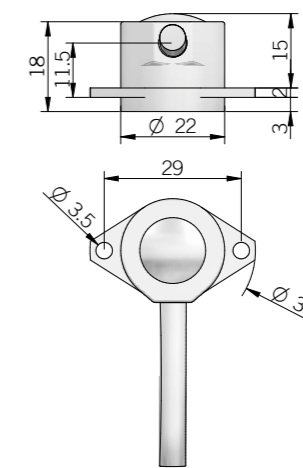
ORDERING CODE

EMI	22A	1024	Z	5	P	6	S	10	P	R	.XXX
<p>SERIES magnetic incremental encoder series EMI</p> <p>MODEL clamping flange \varnothing 22 mm 22A for anodized version please directly contact our offices</p> <p>RESOLUTION ppr from 2 to 2048 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY 5 V DC 5</p> <p>ELECTRICAL INTERFACE push-pull P line driver RS-422 L</p> <p>MAGNET-ACTUATOR BORE DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10</p> <p>ENCLOSURE RATING IP 67 S</p> <p>MAX ROTATION SPEED 10000 rpm 10</p> <p>OUTPUT TYPE cable (standard length 0,5 m) P preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)</p> <p>DIRECTION TYPE axial A radial R</p> <p>VARIANT custom version XXX</p>											

22 A axial cable output



22 A radial cable output



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 2048 ppr
Power supply	4,5 ... 5,5 V DC
Current consumption without load	100 mA max
Max load current	15 mA / channel
Output type*	push pull / line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	205 kHz
Counting direction	A leads B with clockwise rotation (magnet-actuator view)
Accuracy	$\pm 0,35^\circ$ typical / $\pm 0,50^\circ$ max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
—	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter (magnet-actuator)	\varnothing 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	IP 67 (IEC 60529)
Max rotation speed	10000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia (magnet-actuator)	$0,1 \times 10^{-6} \text{ kgm}^2$ ($2,4 \times 10^{-6} \text{ lbft}^2$)
Bearing stage material	EN-AW 2011 aluminum
Housing material	EN-AW 2011 aluminum
Magnet-actuator material	EN-AW 2011 aluminum
Operating temperature	-40° ... +125°C (-40° ... +257°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	30 g (1,06 oz)
Magnet actuator mounting tolerances (to get best electrical performances)	$\pm 0,2$ mm (axial) $\pm 0,1$ mm (radial)

RESOLUTIONS

2 - 4 - 8 - 10 - 16 - 20 - 32 - 40 - 64 - 80 - 100 - 125 - 128 - 200 - 250 - 256 - 400 - 500 - 512 - 1024 - 2048

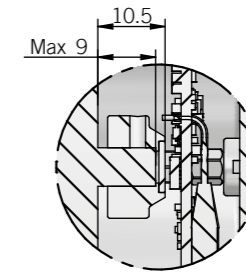
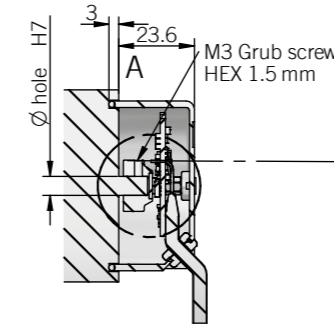
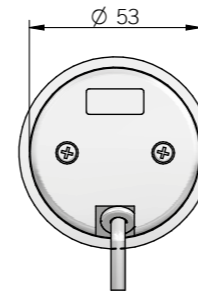
MAIN FEATURES

Series of miniaturized encoders for integration on small size AC/DC motors, stepper motors or for limited size applications.

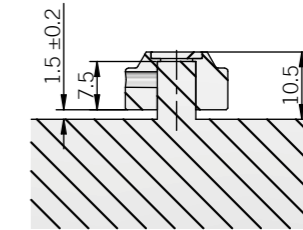
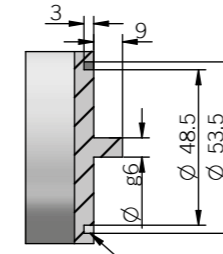
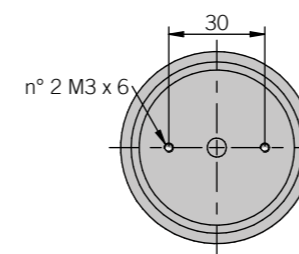
- 3 channel encoder (A / B / Z) up to 90 ppr
- Power supply up to +30 V DC with several electrical interfaces available
- Cable output, connector available on cable end
- Compact dimensions (only 23,6 mm height)
- No wear due to no contact magnetic technology
- Bore shaft diameter up to 10 mm
- Wide operating temperature -20° ... +100°C (-4° ... +212°F)
- OEM version without cover available



30 M



RECOMMENDED INTERFACE FLANGE DESIGN



dimensions in mm

Groove for cover

ORDERING CODE

SERIES	MODEL	COVER	RESOLUTION	ZERO PULSE	POWER SUPPLY	ELECTRICAL INTERFACE	BORE DIAMETER	ENCLOSURE RATING	OPTION	OUTPUT TYPE	VARIANT
magnetic incremental encoder series EMI	kit encoder 30M	* add if without cover S	ppr from 1 to 90	without zero pulse S with zero pulse Z	5 V DC 5 5 ... 30 V DC 5/30	NPN open collector C push-pull P line driver L power supply 5/30V - output RS-422 RS	mm 6 (1/4") mm 6,35 mm 8 mm 10	IP 54 X	to be reported X	radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	custom version XXX

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 90 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/30 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	5 = 200 mW typical 5/30 = < 400 mW
Max load current	C / P = 50 mA for channel L / RS = 20 mA per channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	15 kHz
Counting direction	A leads B clockwise (magnet actuator view)
Accuracy	± 0,35° typical / ± 0,90° max according to mounting tolerances and temperature range
Startup time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable C / P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield

MECHANICAL SPECIFICATIONS

Bore diameter	ø 6 / 6,35 (1/4") / 8 / 10 mm
Enclosure rating	IP 54 (IEC 60529) when properly installed with supplied oring
Max rotation speed	limited only by output frequency
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,1 x 10 ⁻⁶ kgm ² (2,4 x 10 ⁻⁶ lbft ²)
Magnet-actuator material	EN-AW 2011 aluminium
Cover material	PA66 glass fiber reinforced
Operating temperature	-20° ... +100°C (-4° ... +212°F)
Storage temperature	-20° ... +100°C (-4° ... +212°F)
Nominal airgap + shaft axial play	0,75 mm ± 0,5 mm (including mounting tolerances)
PCB fixing holes / shaft eccentricity tolerance	± 0,5 mm
Fixing torque for grub screws	40 cN (57 Ozin) max
Weight	100 g approx (3,5 oz)

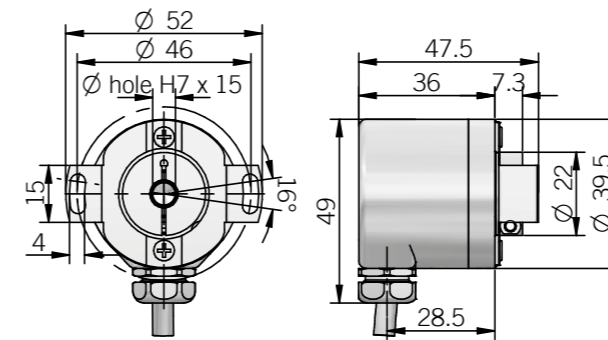
MAIN FEATURES

Thanks to the magnetic technology, the EMI 38 series is suitable for harsh environment applications such as marble and glass working machines, washing systems and generally for industrial automation.

- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Cable output, connector available on cable end
- Compact dimensions
- Blind hollow shaft diameter up to 10 mm with shaft fixing by collar clamping
- Sturdy construction due to separated chambers design
- Wide operating temperature -25° ... +100°C (-13° ... +212°F)

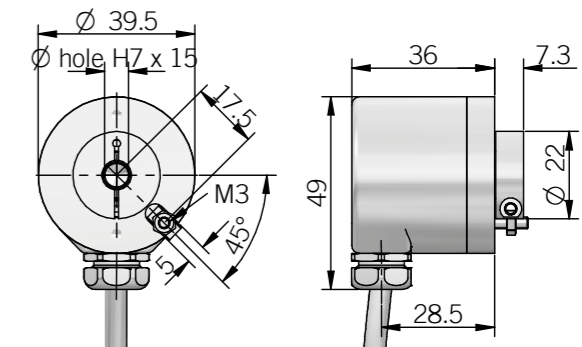


38 F



dimensions in mm

38 G



torque pin is included, for mounting instruction please refer to product installation notes

ORDERING CODE

EMI	38F	1024	Z	5	L	6	X	6	PR	.XXX
SERIES magnetic incremental encoder series EMI										
MODEL blind hollow shaft with stator coupling 38F blind hollow shaft with torque pin 38G										
RESOLUTION ppr from 2 to 2048 see table for pulses availability										
ZERO PULSE without zero pulse S with zero pulse Z										
POWER SUPPLY (with L electrical interface) 5 V DC 5 (with L electrical interface) 8 ... 24 V DC 8/24 5 ... 28 V DC 5/28										
ELECTRICAL INTERFACE push-pull P line driver L										
SHAFT DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10										
ENCLOSURE RATING IP 64 X IP 66 S										
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 64) 6000 rpm 6										
OUTPUT TYPE radial cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)										
VARIANT custom version XXX										

ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,75 ... 29,4 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	80 mA max
Max load current	15 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	205 kHz
Counting direction	A leads B clockwise (shaft view)
Accuracy	± 0,35° typical / ± 0,50° max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RESOLUTIONS

2 - 4 - 8 - 10 - 16 - 20 - 32 - 40 - 64 - 80 - 100 - 125 - 128 - 200 - 250 - 256 - 400 - 500 - 512 - 1024 - 2048

CONNECTIONS

Function	Cable P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
≡	shield	shield

MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 6* / 8* / 9,52 (3/8") / 10 mm * with supplied adapter shaft
Enclosure rating	X = IP 64 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 66 - 3000 rpm IP 64 - 6000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,25 x 10 ⁻⁶ kgm ² (6 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearing lifetime	10 ⁹ revolutions
Operating temperature	-25° ... +100°C (-13° ... +212°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for collar clamping	0,6 Nm (85 Ozin) recommended
Weight	150 g (5,29 oz)

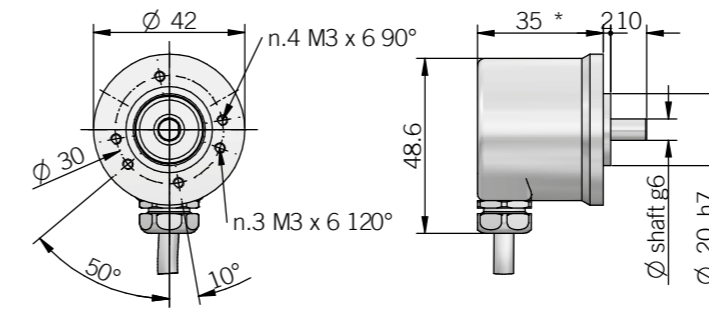
MAIN FEATURES

Thanks to the magnetic technology, EMI 40 series is suitable for harsh environment applications such as marble and glass working machines, washing systems and generally for industrial automation.

- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Cable output, connector available on cable end
- Compact dimensions
- Solid shaft diameter up to 6 mm
- Sturdy construction due to separated chambers design
- Wide operating temperature -25° ... +100°C (-13° ... +212°F)

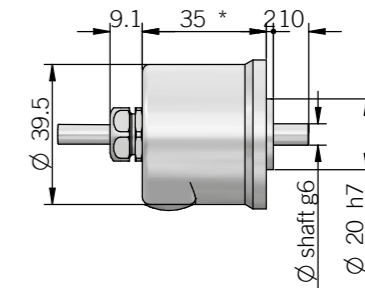


40 A radial cable output



dimensions in mm

40A axial cable output



* IP66 + 7mm

ORDERING CODE

EMI	40A	1024	Z	5	L	6	X	3	P	R	.XXX
<p>SERIES magnetic incremental encoder series EMI</p> <p>MODEL clamping flange Ø 20 mm 40A</p> <p>RESOLUTION ppr from 2 to 2048 see table for pulses availability</p> <p>ZERO PULSE without zero pulse S with zero pulse Z</p> <p>POWER SUPPLY (with L electrical interface) 5 V DC 5 (with L or PC electrical interface) 8 ... 24 V DC 8/24 5 ... 28 V DC 5/28</p> <p>ELECTRICAL INTERFACE push-pull P line driver L</p> <p>SHAFT DIAMETER mm 4 mm 6</p> <p>ENCLOSURE RATING IP 64 X IP 66 S</p> <p>MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 64) 6000 rpm 6</p> <p>OUTPUT TYPE cable (standard length 0,5 m) P preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)</p> <p>DIRECTION TYPE axial A radial R</p> <p>VARIANT custom version XXX</p>											

ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,75 ... 29,4 V DC 8/24 = 7,6 ... 25,2 V DC (reverse polarity protection)
Current consumption without load	80 mA max
Max load current	15 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	205 kHz
Counting direction	A leads B clockwise (shaft view)
Accuracy	± 0,35° typical / ± 0,50° max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
≡	shield	shield

MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 4 / 6 mm
Enclosure rating	X = IP 64 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 66 - 3000 rpm IP 64 - 6000 rpm
Max shaft load	5 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearing lifetime	10 ⁹ revolutions
Operating temperature	-25° ... +100°C (-13° ... +212°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	150 g (5,29 oz)

RESOLUTIONS

2 - 4 - 8 - 10 - 16 - 20 - 32 - 40 - 64 - 80 - 100 - 125 - 128 - 200 - 250 - 256 - 400 - 500 - 512 - 1024 - 2048

MAIN FEATURES

EMI series encoders are suitable for several application fields like electric motors marine industry, iron and steel industry, textile machines, wood-working, paper-working, glass working, marble-working machinery and, more generally, automation and process control fields.

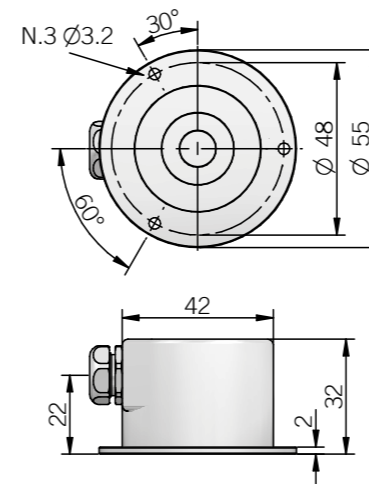
- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Cable or M12 connector output, other connector available on cable end
- Compact dimensions
- No wear due to no contact magnetic technology
- Bore shaft diameter up to 10 mm
- IP 67 Enclosure rating
- Wide operating temperature -40° ... +125°C (-40° ... +257°F)



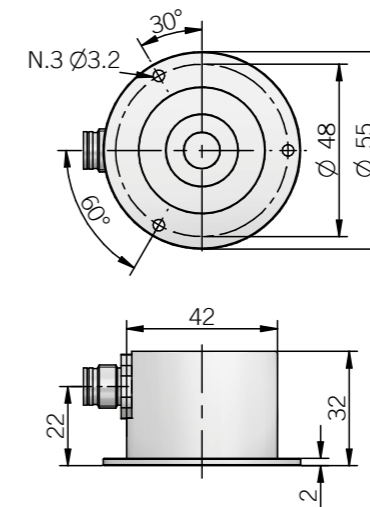
ORDERING CODE

EMI	55A	512	Z	5/28	P	10	X	10	P	R	.XXX
SERIES magnetic incremental encoder series EMI											
MODEL fixing holes \varnothing 48 mm 55A fixing holes \varnothing 48 mm anodized 55AY											
RESOLUTION ppr from 2 to 2048 see table for pulses availability											
ZERO PULSE without zero pulse S with zero pulse Z											
POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28											
ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28 V - output RS-422 RS											
MAGNET ACTUATOR BORE DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10											
ENCLOSURE RATING IP 64 X IP 67 S											
MAX ROTATION SPEED 10000 rpm 10											
OUTPUT TYPE cable (standard length 0,5 m) P preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) M12 connector M12 female connector included, without female please add 162 as variant code											
DIRECTION TYPE axial A radial R											
VARIANT custom version XXX											

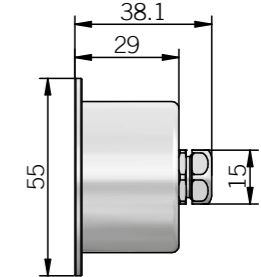
55 A radial cable output



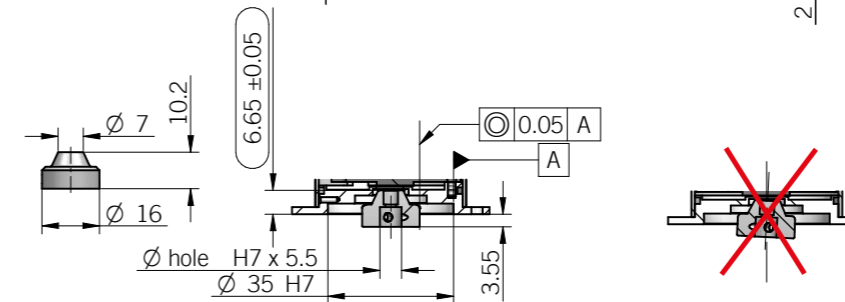
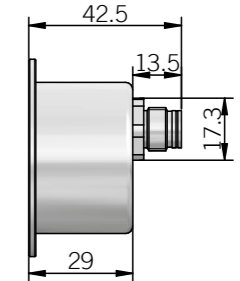
55 A radial M12 output



55 A axial cable output



55 A axial M12 output



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	15 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	205 kHz
Counting direction	A leads B clockwise (shaft view)
Accuracy	± 0,35° typical / ± 0,50° max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P / L / RS	5 pin M12 P	8 pin M12 L / RS
0 V	black	4	1
+V DC	red	2	7
Ch. A	green	3	6
Ch. B	yellow	1	4
Ch. Z	blue	5	2
Ch. A-	brown	/	5
Ch. B-	orange	/	3
Ch. Z-	white	/	8
⊥	shield	housing	housing

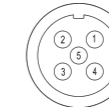
MECHANICAL SPECIFICATIONS

Bore diameter (magnet-actuator)	Ø 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 64 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	10000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia (magnet actuator)	0,1 x 10 ⁻⁶ kgm ² (2,4 x 10 ⁻⁶ lbf ²)
Bearing stage material	EN-AW 2011 aluminum
Housing material	painted aluminum
Magnet-actuator material	EN-AW 2011 aluminum
Operating temperature	-40° ... +125°C (-40° ... +257°F) (with + 5 V DC) -40° ... +100°C (-40° ... +212°F)
Storage temperature	-40° ... +125°C (-40° ... +257°F)
Weight	150 g (5,29 oz)
Magnet actuator mounting tolerances (to get best electrical performances)	± 0,2 mm (axial) ± 0,1 mm (radial)

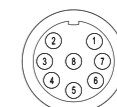
RESOLUTIONS

2 - 4 - 8 - 10 - 16 - 20 - 32 - 40 - 64 - 80 - 100 - 125 - 128 - 200 - 250 - 256 - 400 - 500 - 512 - 1024 - 2048

M12 connector (5 pin)
M12 A coded
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



MAIN FEATURES

Thanks to the magnetic technology, the EMI 63 series is suitable for harsh environment applications such as marble and glass working machines, washing systems, metal working machines and all the applications where high temperature resistance is required.

- 3 channel encoder (A / B / Z) up to 2048 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 300 kHz output frequency
- Cable or M12 connector output, other connector available on cable end
- Solid shaft diameter up to 10 mm
- Mounting by synchronous or centering 2,5" square flange
- Sturdy construction due to separated chambers design
- Wide operating temperature -25° ... +100°C (-13° ... +212°F)

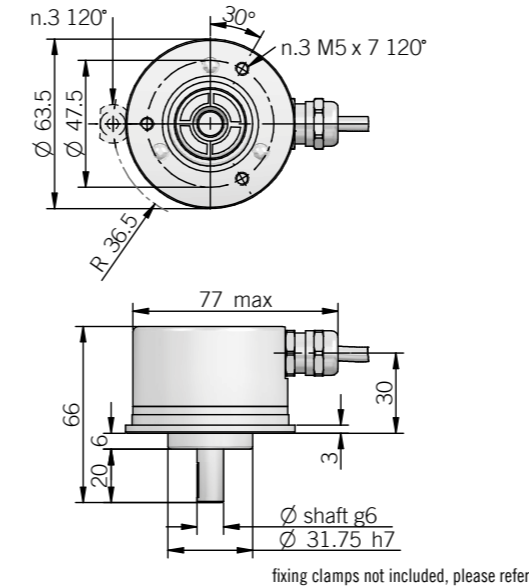


ORDERING CODE

EMI 63A 1024 Z 5 L 10 X 6 P R .XXX

SERIES magnetic incremental encoder series EMI	MODEL synchronous flange ø 31,75 mm 63A centering square flange ø 31,75 mm 63D	RESOLUTION ppr from 2 to 2048 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28 V - output RS-422 RS	SHAFT DIAMETER (3/8") 9,52 mm 9 mm 10	ENCLOSURE RATING IP 64 X IP 66 S	MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 64) 6000 rpm 6	OUTPUT TYPE cable (standard length 0,5 m) P preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) M12 connector M12 female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX
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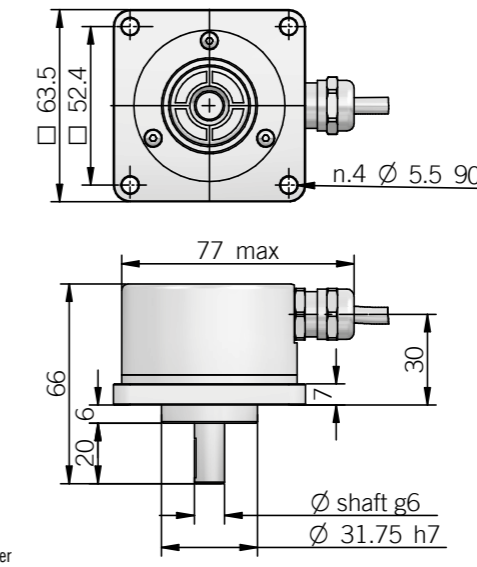
63 A



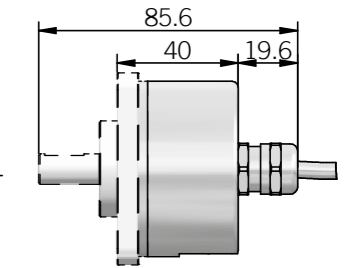
fixing clamps not included, please refer to Accessories section

dimensions in mm

63 D



Dimensions with axial output



ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 2048 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	15 mA / channel
Output type*	push-pull / line driver HTL (AEC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	205 kHz
Counting direction	A leads B clockwise (shaft view)
Accuracy	± 0,35° typical / ± 0,50° max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P / L / RS	5 pin M12 P	8 pin M12 L / RS
0 V	black	4	1
+V DC	red	2	7
Ch. A	green	3	6
Ch. B	yellow	1	4
Ch. Z	blue	5	2
Ch. A-	brown	/	5
Ch. B-	orange	/	3
Ch. Z-	white	/	8
⊥	shield	housing	housing

MECHANICAL SPECIFICATIONS

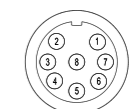
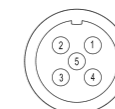
Shaft diameter	ø 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 64 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 66 - 3000 rpm IP 64 - 6000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbfm ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin) (IP 64) < 0,08 Nm (11,33 Ozin) (IP 66)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearing lifetime	10 ⁹ revolutions
Operating temperature	-25° ... +100°C (-13° ... +212°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	350 g (12,35 oz)

RESOLUTIONS

2 - 4 - 8 - 10 - 16 - 20 - 32 - 40 - 64 - 80 - 100 - 125 - 128 - 200 - 250 - 256 - 400 - 500 - 512 - 1024 - 2048

M12 connector (5 pin)
M12 A coded
solder side view FV

M12 connector (8 pin)
M12 A coded
solder side view FV



MAIN FEATURES

Contactless encoder with through hollow shaft up to 28 mm. The compact size (only 11 mm thickness), the high IP grade and resistance to vibrations make this product an excellent solutions for heavy duty applications.

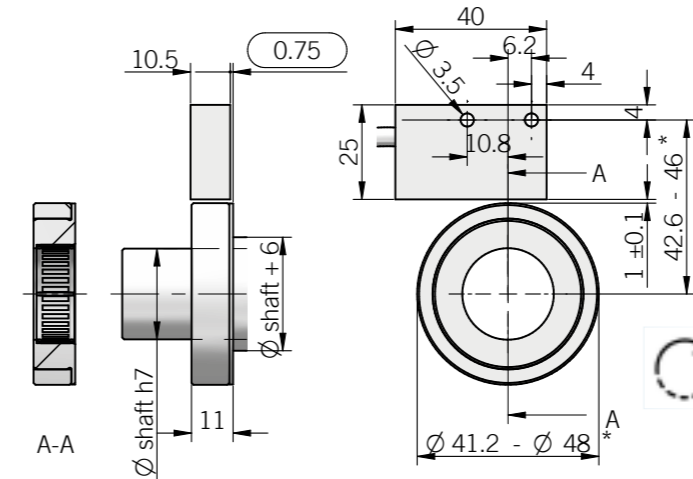
- 2 channel encoder (A / B) up to 4096 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 350 kHz output frequency
- Cable output, connector available on cable end
- Through hollow shaft diameter up to 28 mm
- Shaft mounting with star-ring
- Wide operating temperature -20° ... +85°C (-4° ... +185°F)



ORDERING CODE **ETM** **R** **4096** **S** **5** **L** **9** **S** **8** **PR** **.XXX**

SERIES magnetic incremental encoder series ETM	MODEL through hollow ring R	RESOLUTION ppr from 64 to 4096 see table for pulses availability	ZERO PULSE without zero pulse S	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28 V - output RS-422 RS	BORE DIAMETER mm 9 (3/8") mm 9,52 mm 10 mm 11 mm 14 mm 19 mm 24 mm 28	ENCLOSURE RATING IP 67 S	MAX ROTATION SPEED 8000 rpm 8	OUTPUT TYPE cable (standard length 1,5 m) PR preferred cable lengths 2 / 3 / 5 / 10 m, to be added after OUTPUT TYPE (eg. PR5)	VARIANT custom version XXX
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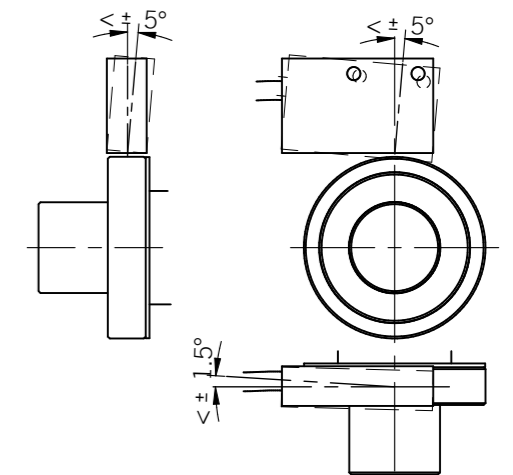
ETMR



* 42,6 / 41,2 for shaft up to Ø 19 mm
46 / 48 for shaft from Ø 24 / 28 mm

dimensions in mm

Mounting tolerances



for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

Resolution	from 64 to 4096 ppr (powers of 2)
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW max
Max load current	20 mA / channel
Output type*	push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	350 kHz
Counting direction	A leads B clockwise
Accuracy	± 0,35° typical / ± 0,50° max
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
⊖	shield	shield

MECHANICAL SPECIFICATIONS

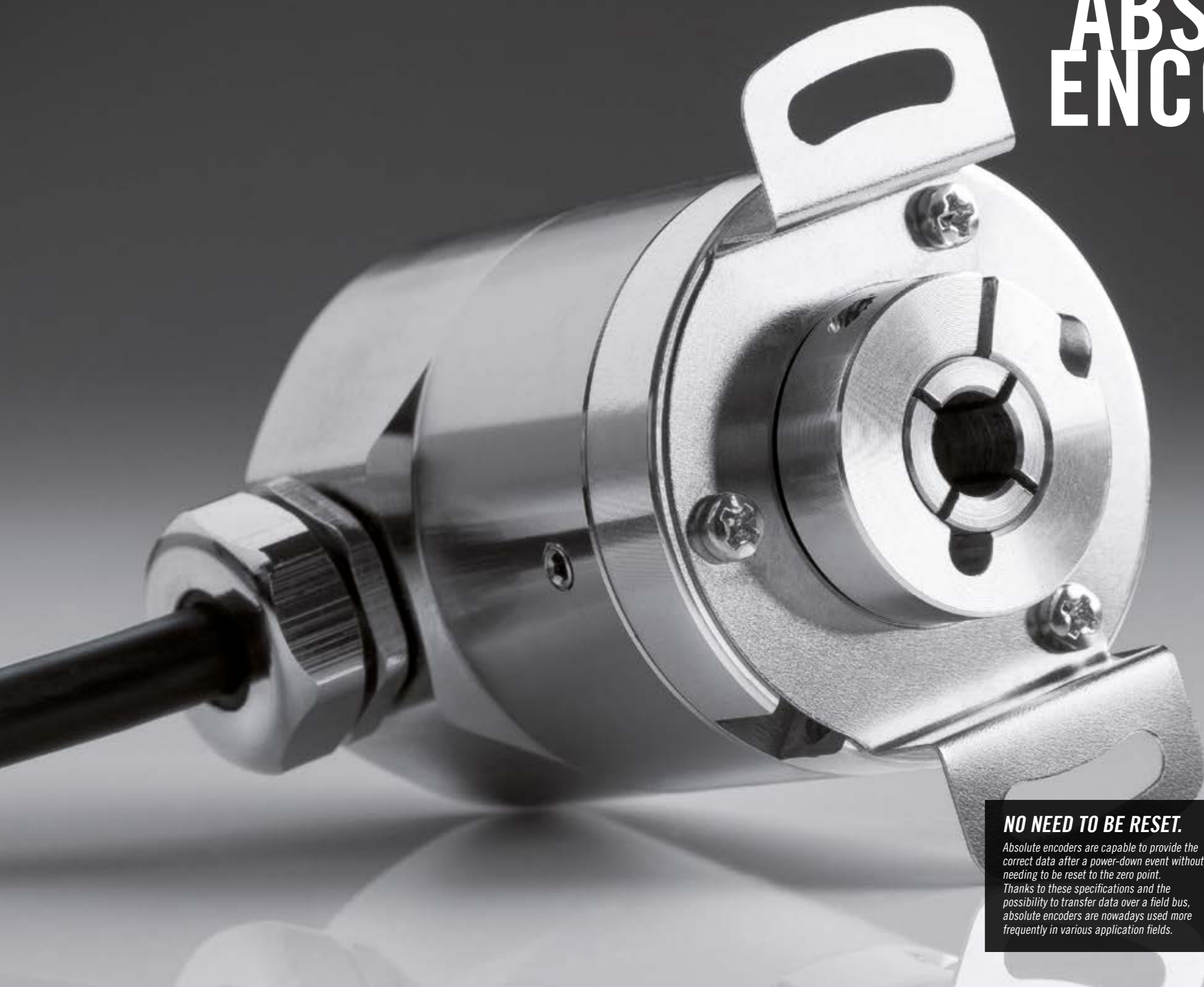
Bore diameter	Ø 9 / 9,52 (3/8") / 10 / 11 / 14 / 19 / 24 / 28 mm
Enclosure rating	IP 67 (IEC 60529)
Max rotation speed	8000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	115 x 10 ⁻⁶ kgm ² (27,29 x 10 ⁻⁴ lbf ²)
Sensor body material	anodized aluminum
Magnet-actuator material	1.4305 / AISI 303 stainless steel
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Weight	100 g (3,53 oz)
Magnet-actuator mounting tolerances	± 1 mm (axial) ± 0.1 mm (radial)

RESOLUTIONS

64* - 128 - 256 - 512 - 1024 - 2048 - 4096

* available with shaft Ø 24 / 28 mm; please directly contact our offices for other pulses

ABSOLUTE ENCODERS



NO NEED TO BE RESET.

Absolute encoders are capable to provide the correct data after a power-down event without needing to be reset to the zero point.

Thanks to these specifications and the possibility to transfer data over a field bus, absolute encoders are nowadays used more frequently in various application fields.

*Max resolution: 13 bit (8192 ppr)
Max number of turns: 39 bit*

*Supported output interfaces are:
Bit parallel, Analogue, SSI, Profibus
and Profinet.*

EA 58 B / C - 63 A / D / E BIT PARALLEL - SSI

SOLID SHAFT SINGLETURN ABSOLUTE ENCODER

MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.



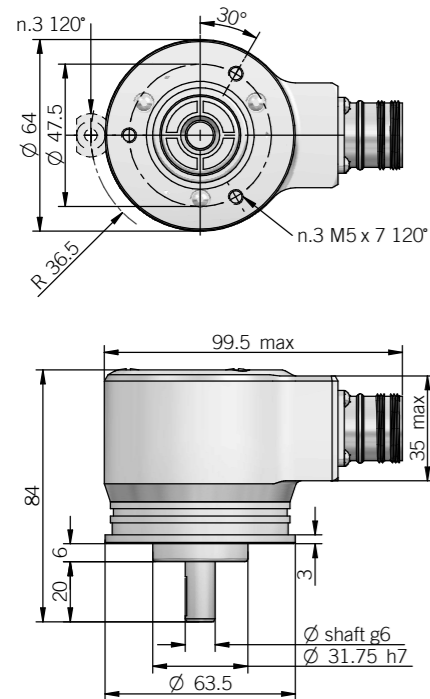
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Code reset for easy setup
- Cable or connector output
- Solid shaft diameter up to 10 mm
- Mounting by synchronous, clamping or centering 2,5" square flange



ORDERING CODE BIT PARALLEL	EA	63A	256	G	8/28	P	P	X	10	X	6	PD	R	.XXX
SERIES singleturn absolute encoder EA														
MODEL synchronous flange ø 31.75 mm 63A synchronous flange ø 50 mm 58B clamping flange ø 36 mm 58C centering square flange ø 31.75 mm 63D centering square flange ø 50 mm 63E														
RESOLUTION (powers of 2) ppr from 2 to 8192 (multiples and submultiples of 360) ppr from 90 to 3600														
CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC														
POWER SUPPLY 8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE push pull P														
LOGIC negative N positive P														
OPTIONS latch L (binary code) strobe S to be reported if not used X														
SHAFT DIAMETER (mod. 58 B) mm 6 (mod. 63 A / D) (3/8") 9,52 mm 9 (mod. 58 C - 63 A / D / E) mm 10														
ENCLOSURE RATING IP 54 X IP 66 S														
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6														
OUTPUT TYPE cable (standard length 1,5 m) PD (with option "latch") cable (standard length 1,5 m) PE 19 pin MIL connector MA female connector included, without female please add 162 as variant code														
DIRECTION TYPE axial A radial R														
VARIANT custom version XXX														

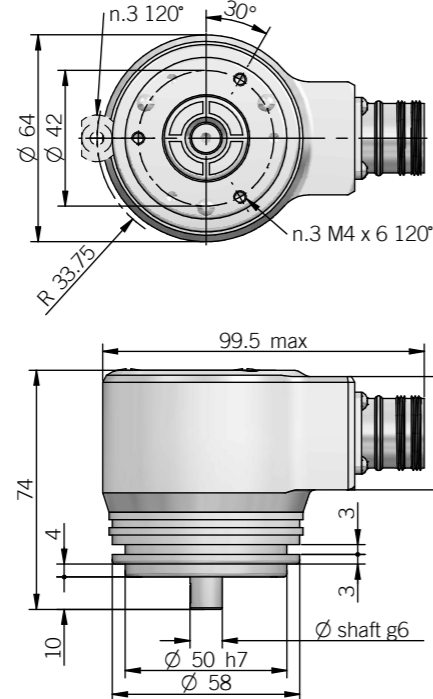
ORDERING CODE SSI	EA	63A	4096	G	8/28	S	X	X	10	X	6	PC	R	.XXX
SERIES singleturn absolute encoder EA														
MODEL synchronous flange ø 31.75 mm 63A synchronous flange ø 50 mm 58B clamping flange ø 36 mm 58C centering square flange ø 31.75 mm 63D centering square flange ø 50 mm 63E														
RESOLUTION ppr 360 / 720 / 1440 / 2880 / 3600 / 4096 / 8192 please directly contact our offices for other pulses														
CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC														
POWER SUPPLY 8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S														
LOGIC to be reported X														
OPTIONS to be reported if not used X reset ZE														
SHAFT DIAMETER (mod. 58 B) mm 6 (mod. 63 A / D) (3/8") 9,52 mm 9 (mod. 58 C - 63 A / D / E) mm 10														
ENCLOSURE RATING IP 54 X IP 66 S														
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6														
OUTPUT TYPE cable (standard length 1,5 m) PC 7 pin MIL connector MC (with option RESET) 10 pin MIL connector MD 12 pin M23 connector HA 8 pin M12 connector M12 female connector included, without female please add 162 as variant code														
DIRECTION TYPE axial A radial R														
VARIANT custom version XXX														

63 A



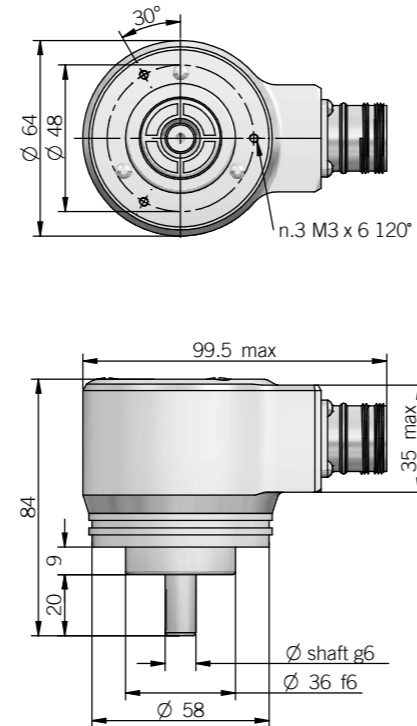
fixing clamps not included, please refer to Accessories section

58 B

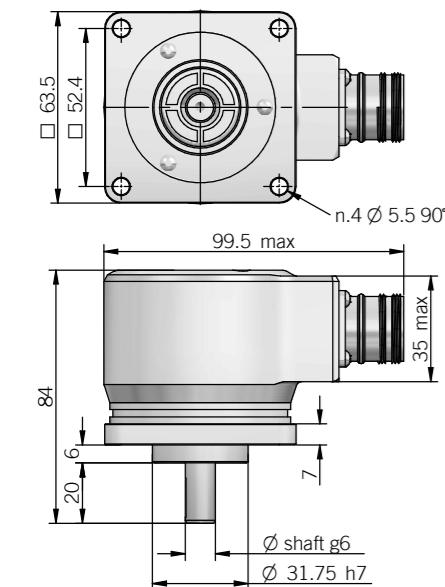


fixing clamps not included, please refer to Accessories section

58 C

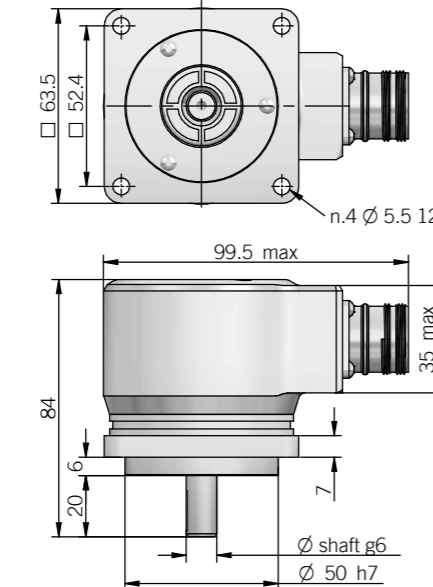


63 D

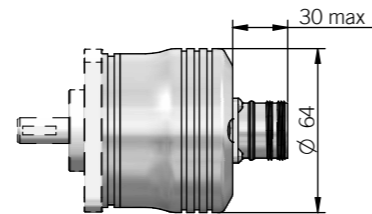


dimensions in mm

63 E



Dimensions with axial output



ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (I ^C -HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch - Reset)	active high (+V DC) connect to 0 V if not used / Reset - Latch t _{min} 150 ms
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (T _m)	18 μs
SSI pause time (T _p)	> 35 μs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A
bit 2	B ¹ / G ¹	yellow	yellow	B
bit 3	B ² / G ²	blue	blue	C
bit 4	B ³ / G ³	brown	brown	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E
bit 6	B ⁵ / G ⁵	white	white	F
bit 7	B ⁶ / G ⁶	grey	grey	G
bit 8	B ⁷ / G ⁷	purple	purple	H
bit 9	B ⁸ / G ⁸	gray / pink	gray / pink	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N
STROBE	/	/	green / blue	P
LATCH	/	/	yellow / grey	R
0 V	/	black	black	T
U / D	/	red / blue	red / blue	U
+ V DC	/	red	red	V
⊥	/	shield	shield	S

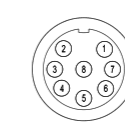
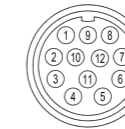
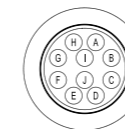
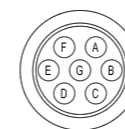
MC connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV

MD connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV

HA connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV

M12 connector (8 pin)
M12 A coded
solder side view FV

MA connector (19 pin)
Amphenol 621N 12E 14-19 P
solder side view FV



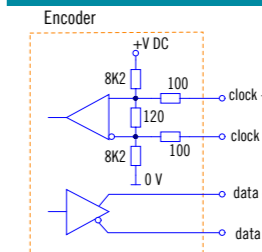
MECHANICAL SPECIFICATIONS

Shaft diameter	φ 6 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	10 N axial / 20 N radial with φ6 shaft 100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painting aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	500 g (17,64 oz)

SSI CONNECTIONS

Function	Cable PC	7 pin MC	10 pin MD	12 pin HA	8 pin M12
+ V DC	red	G	G	8	8
0 V	black	F	F	1	5
data +	green	C	C	2	3
data -	brown	D	D	10	2
clock +	yellow	A	A	3	4
clock -	orange or pink	B	B	11	6
RESET	white	/	H	4	1
U / D	red / blue	E	E	5	7
⊥	shield	housing	J	9	housing

SSI SCHEMATICS



EA 58 F - 63 F / G BIT PARALLEL - SSI

BLIND HOLLOW SHAFT SINGLETURN ABSOLUTE ENCODER

MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.



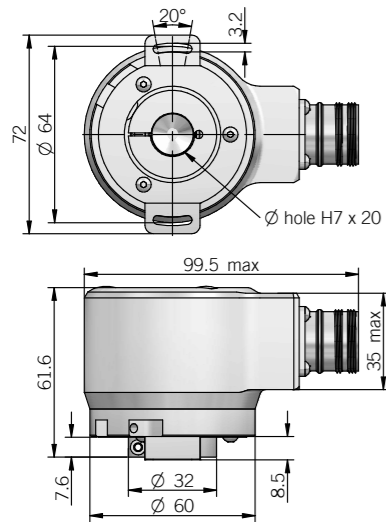
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Code reset for easy setup
- Cable or connector output
- Blind hollow shaft diameter up to 15 mm
- Mounting by stator coupling, spring or torque pin



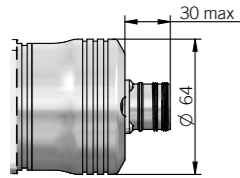
ORDERING CODE BIT PARALLEL	EA	63G	256	G	8/28	P	P	X	8	X	3	PD	R	.XXX
SERIES singleturn absolute encoder EA														
MODEL blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G														
RESOLUTION (powers of 2) ppr from 2 to 8192 (multiples and submultiples of 360) ppr from 90 to 3600														
CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC														
POWER SUPPLY 8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE push pull P														
LOGIC negative N positive P														
OPTIONS latch L (binary code) strobe S to be reported if not used X														
BORE DIAMETER mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15														
ENCLOSURE RATING IP 54 X														
MAX ROTATION SPEED 3000 rpm 3														
OUTPUT TYPE cable (standard length 1,5 m) PD (with option "latch") cable (standard length 1,5 m) PE 19 pin MIL connector MA female connector included, without female please add 162 as variant code														
DIRECTION TYPE axial A radial R														
VARIANT custom version XXX														

ORDERING CODE SSI	EA	63G	4096	G	8/28	S	X	X	8	X	3	PC	R	.XXX
SERIES singleturn absolute encoder EA														
MODEL blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G														
RESOLUTION ppr 360 / 720 / 1440 / 2880 / 3600 / 4096 / 8192 please directly contact our offices for other pulses														
CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC														
POWER SUPPLY 8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S														
LOGIC to be reported X														
OPTIONS to be reported if not used X reset ZE														
BORE DIAMETER mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15														
ENCLOSURE RATING IP 54 X														
MAX ROTATION SPEED 3000 rpm 3														
OUTPUT TYPE cable (standard length 1,5 m) PC 7 pin MIL connector MC (with option "reset") 10 pin MIL connector MD 12 pin M23 connector HA 8 pin M12 connector M12 female connector included, without female please add 162 as variant code														
DIRECTION TYPE axial A radial R														
VARIANT custom version XXX														

58 F

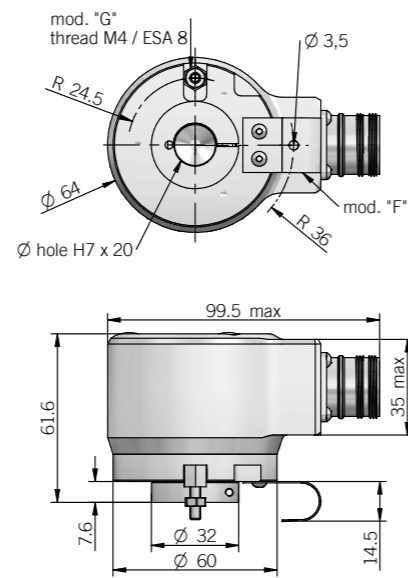


Dimensions with axial output



dimensions in mm

63 F - G



torque pin is included in model G, for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

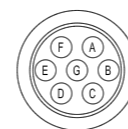
Resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (iC-HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch - Reset)	active high (+V DC) connect to 0 V if not used / Reset - Latch tmin 150 ms
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	18 μs
SSI pause time (Tp)	> 35 μs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

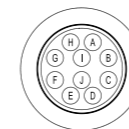
BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A
bit 2	B ¹ / G ¹	yellow	yellow	B
bit 3	B ² / G ²	blue	blue	C
bit 4	B ³ / G ³	brown	brown	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E
bit 6	B ⁵ / G ⁵	white	white	F
bit 7	B ⁶ / G ⁶	grey	grey	G
bit 8	B ⁷ / G ⁷	purple	purple	H
bit 9	B ⁸ / G ⁸	gray / pink	gray / pink	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N
STROBE	/	/	green / blue	P
LATCH	/	/	yellow / grey	R
0 V	/	black	black	T
U / D	/	red / blue	red / blue	U
+ V DC	/	red	red	V
≡	/	shield	shield	S

MC connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



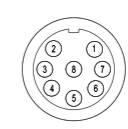
MD connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



HA connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



MA connector (19 pin)
Amphenol 62IN 12E 14-19 P
solder side view FV



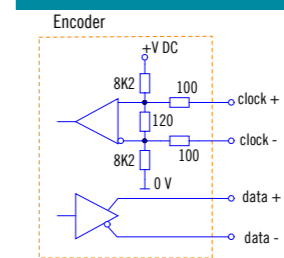
MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 8* / 9* / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	5 x 10 ⁻⁶ kgm ² (119 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	450 g (15,87 oz)

SSI CONNECTIONS

Function	Cable PC	7 pin MC	10 pin MD	12 pin HA	8 pin M12
+ V DC	red	G	G	8	8
0 V	black	F	F	1	5
data +	green	C	C	2	3
data -	brown	D	D	10	2
clock +	yellow	A	A	3	4
clock -	orange or pink	B	B	11	6
RESET	white	/	H	4	1
U / D	red / blue	E	E	5	7
≡	shield	housing	J	9	housing

SSI SCHEMATICS



EA 90 A - 115 A BIT PARALLEL - SSI SOLID SHAFT SINGLETURN ABSOLUTE ENCODER

MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.



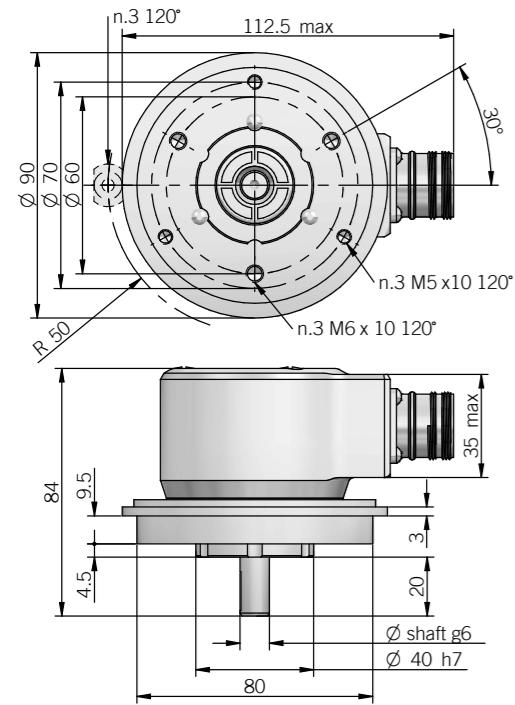
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Code reset for easy setup
- Cable or connector output
- Solid shaft diameter up to 11 mm
- Mounting by synchronous or REO-444 flange



ORDERING CODE	EA	90A	256	G	8/28	P	P	X	10	X	6	PD	R	.XXX
BIT PARALLEL														
SERIES	singleturn absolute encoder EA													
MODEL	synchronous flange ø 40 mm 90A REO-444 flange 115A													
RESOLUTION	(powers of 2) ppr from 2 to 8192 (multiples and submultiples of 360) ppr from 90 to 3600													
CODE TYPE	binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC													
POWER SUPPLY	8 ... 28 V DC 8/28													
ELECTRICAL INTERFACE	push pull P													
LOGIC	negative N positive P													
OPTIONS	latch L (binary code) strobe S to be reported if not used X													
SHAFT DIAMETER	(mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11													
ENCLOSURE RATING	IP 54 X (mod. 90) IP 66 S													
MAX ROTATION SPEED	(IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6													
OUTPUT TYPE	cable (standard length 1,5 m) PD (with option "latch") cable (standard length 1,5 m) PE 19 pin MIL connector MA female connector included, without female please add 162 as variant code													
DIRECTION TYPE	axial A radial R													
VARIANT	custom version XXX													

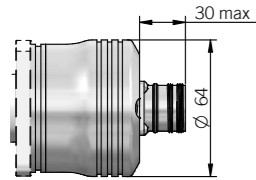
ORDERING CODE	EA	90A	4096	G	8/28	S	X	X	10	X	6	PC	R	.XXX
SSI														
SERIES	singleturn absolute encoder EA													
MODEL	synchronous flange ø 40 mm 90A REO-444 flange 115A													
RESOLUTION	ppr 360 / 720 / 1440 / 2880 / 3600 / 4096 / 8192 please directly contact our offices for other pulses													
CODE TYPE	binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC													
POWER SUPPLY	8 ... 28 V DC 8/28													
ELECTRICAL INTERFACE	Serial Synchronous Interface - SSI S													
LOGIC	to be reported X													
OPTIONS	to be reported if not used X reset ZE													
SHAFT DIAMETER	(mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11													
ENCLOSURE RATING	IP 54 X (mod. 90) IP 66 S													
MAX ROTATION SPEED	(IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6													
OUTPUT TYPE	cable (standard length 1,5 m) PC 7 pin MIL connector MC (with option "reset") 10 pin MIL connector MD 12 pin M23 connector HA 8 pin M12 connector M12 female connector included, without female please add 162 as variant code													
DIRECTION TYPE	axial A radial R													
VARIANT	custom version XXX													

90 A



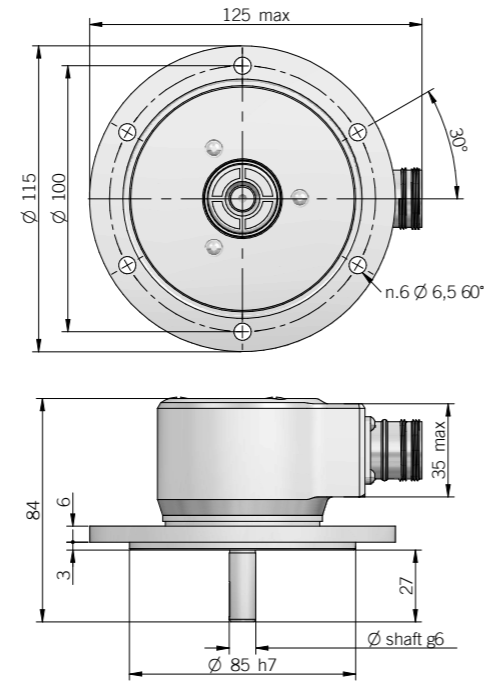
fixing clamps not included, please refer to Accessories section

Dimensions with axial output



dimensions in mm

115 A



ELECTRICAL SPECIFICATIONS

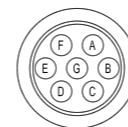
Resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (iC-HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch - Reset)	active high (+V DC) connect to 0 V if not used / Reset - Latch tmin 150 ms
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	18 μs
SSI pause time (Tp)	> 35 μs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

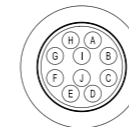
BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A
bit 2	B ¹ / G ¹	yellow	yellow	B
bit 3	B ² / G ²	blue	blue	C
bit 4	B ³ / G ³	brown	brown	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E
bit 6	B ⁵ / G ⁵	white	white	F
bit 7	B ⁶ / G ⁶	grey	grey	G
bit 8	B ⁷ / G ⁷	purple	purple	H
bit 9	B ⁸ / G ⁸	gray / pink	gray / pink	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N
STROBE	/	/	green / blue	P
LATCH	/	/	yellow / grey	R
0 V	/	black	black	T
U / D	/	red / blue	red / blue	U
+ V DC	/	red	red	V
⊥	/	shield	shield	S

MC connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



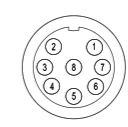
MD connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



HA connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



MA connector (19 pin)
Amphenol 621N 12E 14-19 P
solder side view FV



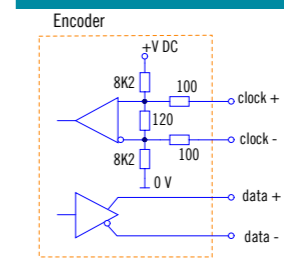
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 9,52 (3/8") / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	650 g (22,93 oz)

SSI CONNECTIONS

Function	Cable PC	7 pin MC	10 pin MD	12 pin HA	8 pin M12
+ V DC	red	G	G	8	8
0 V	black	F	F	1	5
data +	green	C	C	2	3
data -	brown	D	D	10	2
clock +	yellow	A	A	3	4
clock -	orange or pink	B	B	11	6
RESET	white	/	H	4	1
U / D	red / blue	E	E	5	7
⊥	shield	housing	J	9	housing

SSI SCHEMATICS



EA 58 B / C - 63 A / D / E PROFIBUS

SOLID SHAFT SINGLETURN ABSOLUTE ENCODER

MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.

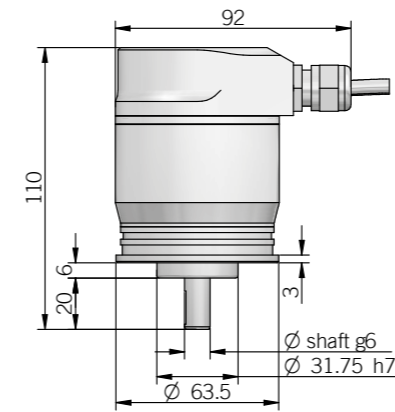
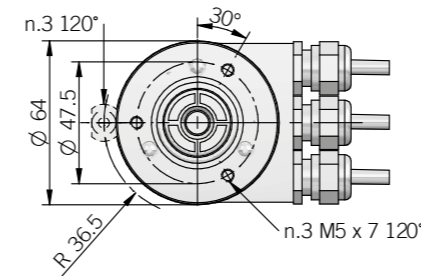
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Cable gland or M12 connector output
- Solid shaft diameter up to 10 mm
- Mounting by synchronous, clamping or centering 2,5" square flange



ORDERING CODE

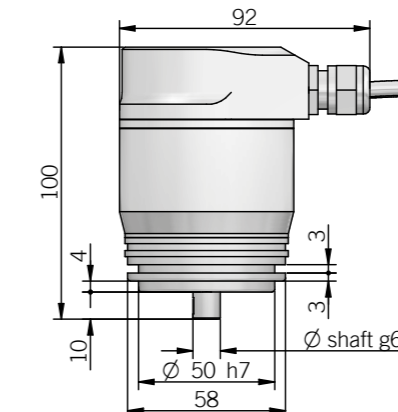
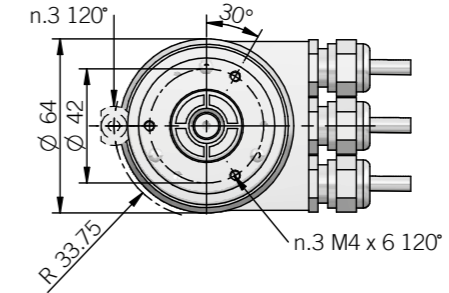
EA	63A	4096	B	12/28	FX	10	X	6	P3R	.XXX
SERIES singleturn absolute encoder EA										
MODEL synchronous flange \varnothing 31.75 mm 63A synchronous flange \varnothing 50 mm 58B clamping flange \varnothing 36 mm 58C centering square flange \varnothing 31.75 mm 63D centering square flange \varnothing 50 mm 63E										
RESOLUTION ppr 4096 / 8192										
CODE TYPE binary B										
POWER SUPPLY 12 ... 28 V DC 12/28										
ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FX										
SHAFT DIAMETER (mod. 58 B) mm 6 (mod. 63 A / D) (9,52mm 3/8") mm 9 (mod. 58 C - 63 A / D / E) mm 10										
ENCLOSURE RATING IP 54 X IP 66 S										
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6										
OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R female connector included, without female please add 162 as variant code										
VARIANT custom version XXX										

63 A



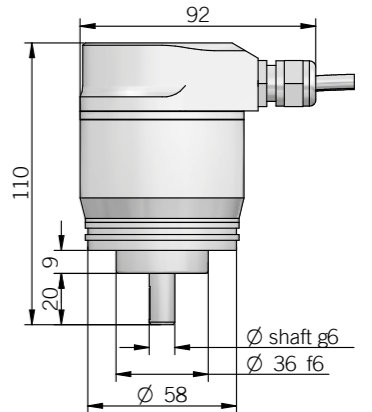
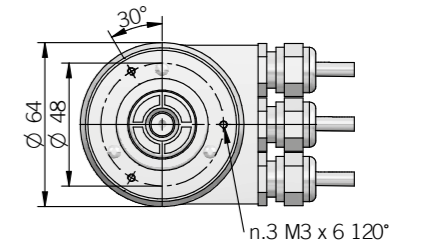
fixing clamps not included, please refer to Accessories section

58 B

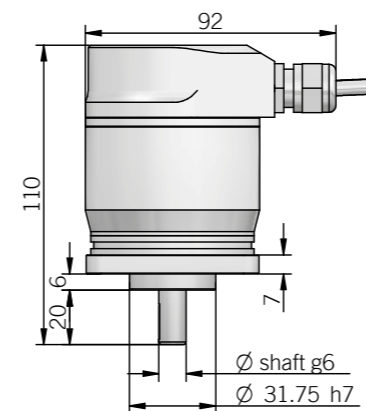
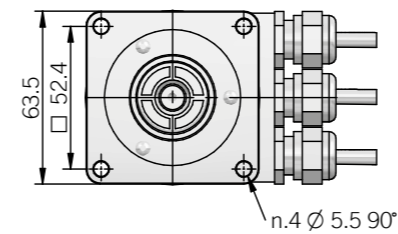


fixing clamps not included, please refer to Accessories section

58 C

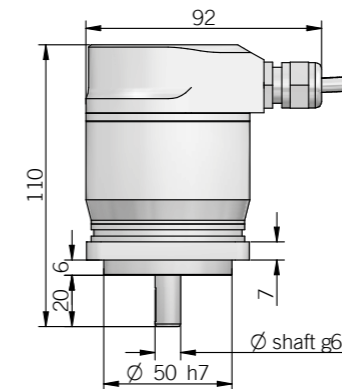
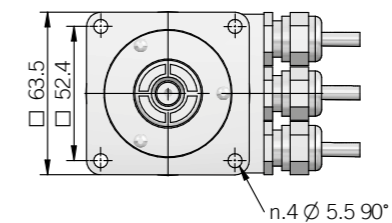


63 D



dimensions in mm

63 E



ELECTRICAL SPECIFICATIONS

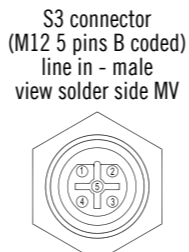
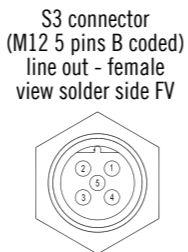
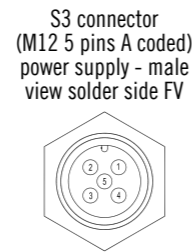
Resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	10 N axial / 20 N radial with ø6 shaft 100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	650 g (22,93 oz)



MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.

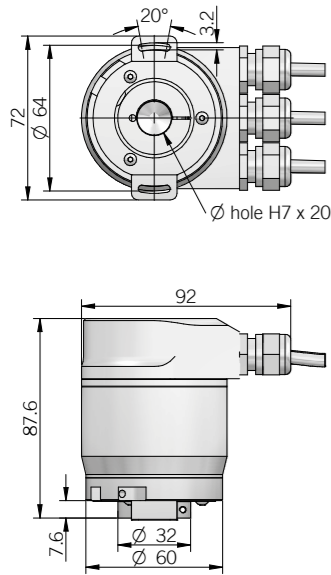
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Cable gland or M12 connector output
- Blind hollow shaft diameter up to 15 mm
- Mounting by stator coupling, spring or torque pin



ORDERING CODE

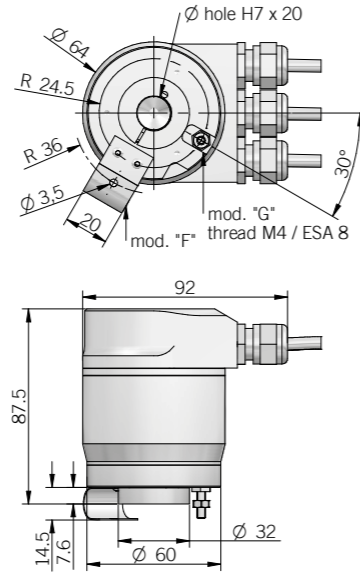
EA	58F	4096	B	12/28	FXX	10	X	3	P3R	.XXX
SERIES singleturn absolute encoder EA										
MODEL blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G										
RESOLUTION ppr 4096 / 8192										
CODE TYPE binary B										
POWER SUPPLY 12 ... 28 V DC 12/28										
ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FXX										
BORE DIAMETER mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15										
ENCLOSURE RATING IP 54 X										
MAX ROTATION SPEED 3000 rpm 3										
OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R female connector included, without female please add 162 as variant code										
VARIANT custom version XXX										

58 F



dimensions in mm

63 F - G



torque pin is included in model G, for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

Resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

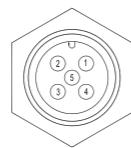
CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

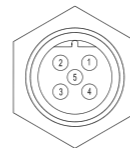
MECHANICAL SPECIFICATIONS

Bore diameter	Ø 8* / 9,52 (3/8")* / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	5 x 10 ⁻⁶ kgm ² (119 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painting aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	650 g (22,93 oz)

S3 connector (M12 5 pins A coded) power supply view solder side FV



S3 connector (M12 5 pins B coded) line out - female view solder side FV



S3 connector (M12 5 pins B coded) line in - male view solder side MV



MAIN FEATURES

Industry standard singleturn absolute encoder for factory automation applications.

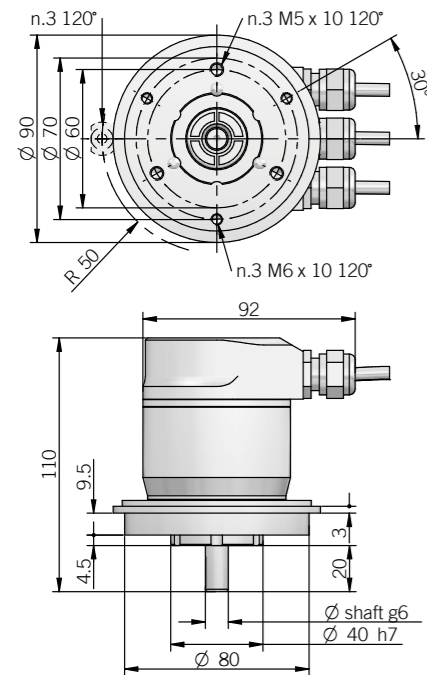
- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Cable gland or M12 connector output
- Solid shaft diameter up to 11 mm
- Mounting by synchronous or REO-444 flange



ORDERING CODE

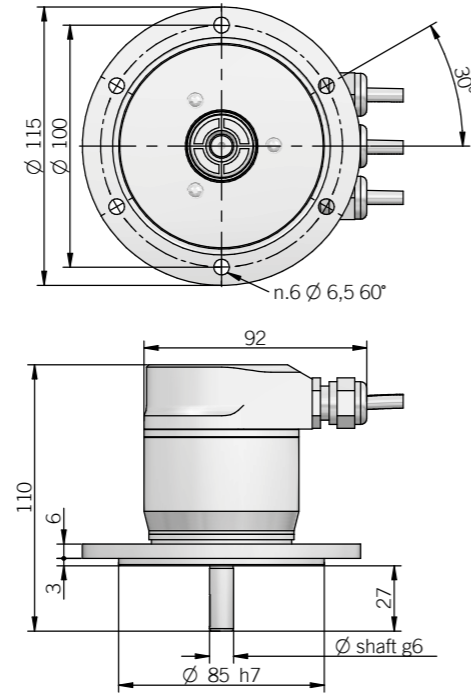
EA	90A	4096	B	12/28	FX	10	X	6	P3R	.XXX
SERIES singleturn absolute encoder EA										
MODEL synchronous flange Ø 40 mm 90A REO-444 flange 115A										
RESOLUTION ppr 4096 / 8192										
CODE TYPE binary B										
POWER SUPPLY 12 ... 28 V DC 12/28										
ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FX										
SHAFT DIAMETER (mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11										
ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S										
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6										
OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R female connector included, without female please add 162 as variant code										
VARIANT custom version XXX										

90 A



fixing clamps not included, please refer to Accessories section
dimensions in mm

115 A



ELECTRICAL SPECIFICATIONS

Resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

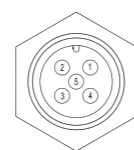
CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

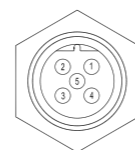
MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 9,52 (3/8") / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	750 g (26,46 oz)

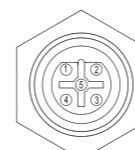
S3 connector (M12 5 pins A coded) power supply view solder side FV



S3 connector (M12 5 pins B coded) line out - female view solder side FV



S3 connector (M12 5 pins B coded) line in - male view solder side MV



MAIN FEATURES

Explosion proof encoder for applications within explosive and hazardous areas.

- Optical sensor technology (OptoASIC)
- Resolution up to 13 bit (8192 ppr)
- Power supply up +28 V DC with SSI as electrical interface
- Code reset for easy setup
- 10mm solid shaft diameter
- Cable output
- Mounting by synchronous or centering square flange

EX CLASSIFICATION

It has been assured with EC-TYPE Examination Certificate CESI 04 ATEX 082 that the EAX 80 comply with essential health and safety requirements according to

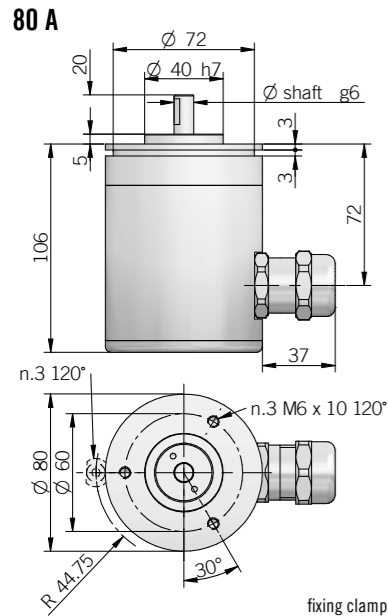
- EN 60079-0:2012+A11:2013
- EN 60079-1:2007
- EN 60079-31:2014

Declaration of conformity and CE declaration are available for download from Eltra website www.eltra.it

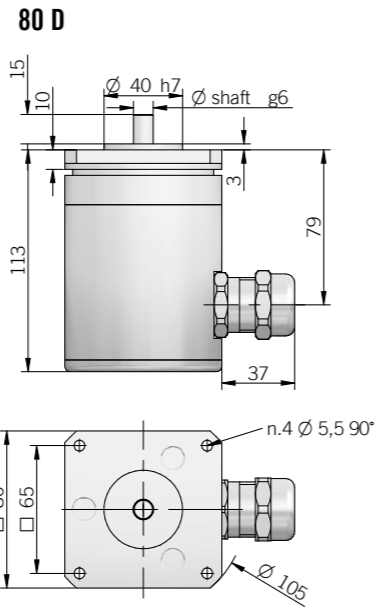


ORDERING CODE EAX 80A 256 G 8/28 S X X 10 X 3 PR .XXX

SERIES singleturn absolute flameproof encoder EAX	MODEL synchronous flange Ø 40 mm 80A centering square flange Ø 40 mm 80D	RESOLUTION ppr 360 / 720 / 1440 / 2880 / 3600 / 4096 / 8192 please directly contact our offices for other pulses	CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC	POWER SUPPLY 8 ... 28 V DC 8/28	ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S	LOGIC to be reported X	OPTIONS to be reported if not used X reset ZE	SHAFT DIAMETER mm 10	ENCLOSURE RATING IP 65 X	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE radial cable (standard length 1,5 m) PR	VARIANT custom version XXX
---	---	---	--	---	---	----------------------------------	--	--------------------------------	------------------------------------	---	---	--------------------------------------



fixing clamps not included, please refer to Accessories section



dimensions in mm

ELECTRICAL SPECIFICATIONS	
Resolution	from 360 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Output type*	RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	18 µs
SSI pause time (Tp)	> 35 µs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS	
Function	Cable
+ V DC	red
0 V	grey
data +	green
data -	brown
clock +	yellow
clock -	pink
U / D	blue
RESET	white
⊕	shield

MECHANICAL SPECIFICATIONS	
Shaft diameter	Ø 10 mm
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	anodized aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	anodized aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +50°C (+32° ... +122°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	1200 g (42,33 oz)

ATEX MARKING	
II 2GD Ex d IIC T6 Gb Ex tb IIIC T85°C Db IP 65	
II 2GD II: group II: different than mines 2: category 2: high level of protection GD: areas containing gas (G) and dust (D) Ex d IIC T6 Gb Ex d: flameproof enclosure for explosive atmospheres with gases, vapours and mists IIC: group of gas IIC T6: max surface temperature +85°C of the device for atmospheres with gas Gb: product with a high level of protection Ex tb IIIC T85°C Db Ex tb: flameproof enclosure safety type IIIC: group of dust combustibles IIIC T85°C: max surface temperature +85°C of the device in the presence of dust Db: product with a high level of protection	

MAIN FEATURES

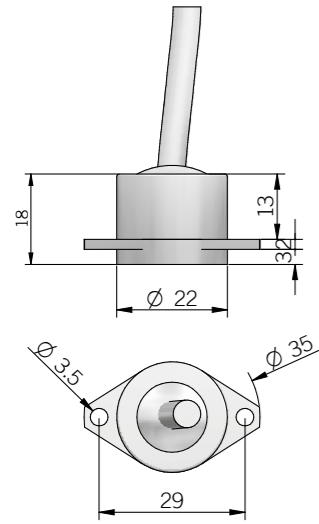
EM series encoders are suitable for several application fields like electric motors, textile machines, wood-working, paper-working, glass working, marble-working machinery and, more generally, automation and process control fields.

- Resolution up to 13 bit (8192 ppr) with SSI as electrical interface
- Cable output, connector available on cable end
- No wear due to no contact magnetic technology
- Bore shaft diameter up to 10 mm
- IP 67 enclosure rating
- Wide operating temperature -40° ... +125°C (-40° ... +257°F)

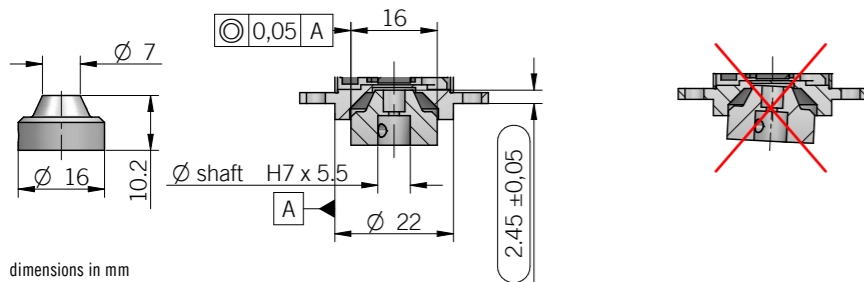
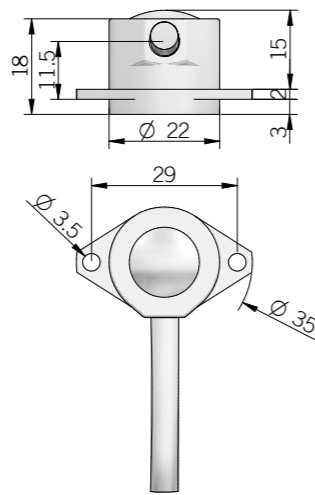


ORDERING CODE	EMA	22A	1024	B	5	S	P	X	6	S	10	P	R	.XXX
SERIES magnetic singleturn absolute encoder EMA														
MODEL clamping flange Ø 22 mm 22A for anodized version please directly contact our offices														
RESOLUTION ppr from 8 to 8192 see table for pulses availability														
CODE TYPE binary B gray G														
POWER SUPPLY 5 V DC 5														
ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S														
LOGIC positive P														
OPTIONS to be reported X														
BORE DIAMETER (MAGNET ACTUATOR) mm 6 mm 8 (3/8") 9,52 mm 9 mm 10														
ENCLOSURE RATING IP 67 S														
MAX ROTATION SPEED 10000 rpm 10														
OUTPUT TYPE cable (standard length 0,5 m) P														
DIRECTION TYPE axial A radial R														
VARIANT custom version XXX														

22 A with axial cable output



22 A with radial cable output



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 8 to 8192 ppr
Power supply	4,75 ... 5,25 V DC
Current consumption without load	100 mA max
Output type*	RS-422 (SN65LBC179Q or equivalent)
SSI output code	binary or gray
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 μs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 0,35° typical / ± 0,50° max
Counting direction	decreasing clockwise (magnet actuator view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable
+ V DC	red
0 V	black
data +	green
data -	brown
clock +	yellow
clock -	orange
⏏	shield

MECHANICAL SPECIFICATIONS

Bore diameter (magnet-actuator)	∅ 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	IP 67 (IEC 60529)
Max rotation speed	10000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia (magnet-actuator)	0,1 x 10 ⁻⁶ kgm ² (2,4 x 10 ⁻⁶ lbfm ²)
Bearing stage material	EN-AW 2011 aluminum
Housing material	EN-AW 2011 aluminum
Magnet-actuator material	EN-AW 2011 aluminum
Operating temperature	-40° ... +125°C (-40° ... +257°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	30 g (1,06 oz)
Magnet actuator mounting tolerances (to get best electrical performances)	± 0,2 mm (axial) ± 0,1 mm (radial)

RESOLUTIONS

8 - 16 - 25 - 32 - 40 - 50 - 64 - 80 - 100 - 125 - 128 - 160 - 200 - 250 - 256 - 320 - 400 - 500 - 512 - 800 - 1000 - 1024 - 1600 - 2000 - 2048 - 4096 - 8192

MAIN FEATURES

Miniaturized singleturn absolute encoder for limited size applications.

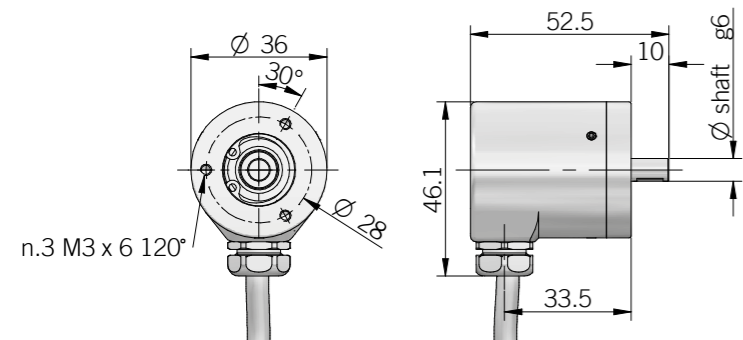
- Magnetic sensor technology without contact (Magnetic ASIC)
- Sturdy construction thanks to separated chambers
- Resolution up to 12 bit (4096 ppr)
- Power supply up to +30 V DC with SSI as electrical interface
- Code reset for easy setup
- Cable output, connector available on cable end
- 6 mm diameter solid shaft
- Mounting by fixing flange



ORDERING CODE EA 36A 12 G 8/30 S P X 6 X 8 P R .XXX

SERIES magnetic singleturn absolute encoder series EA	MODEL fixing flange screw holes ∅ 28 mm 36A	SINGLETURN RESOLUTION from 1 to 12 bit 360 / 720 ppr please directly contact our offices for other pulses	CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC	POWER SUPPLY 5 V DC 5 8 ... 30 V DC 8/30	ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S	LOGIC positive P	OPTIONS to be reported if not used X reset ZE	SHAFT DIAMETER mm 6	ENCLOSURE RATING IP 67 cover side / IP 65 shaft side X	MAX ROTATION SPEED 8000 rpm 8	OUTPUT TYPE cable (standard length 0,5 m) P	DIRECTION TYPE radial R	VARIANT custom version XXX
---	---	---	--	---	---	----------------------------	--	-------------------------------	--	---	---	-----------------------------------	--------------------------------------

36 A



dimensions in mm

ELECTRICAL SPECIFICATIONS

Singleturn resolution	from 1 to 12 bit 360 / 720 ppr
Power supply	5 = 4,75 ... 5,25 V DC 8/30 = 7,6 ... 30 V DC (reverse polarity protection)
Power draw without load	< 400 mW
Output type*	RS-422 (SN65LBC179Q or equivalent)
Code type	binary or gray
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 µs
SSI pause time (Tp)	> 35 µs
SSI frame	(MSB ... LSB) 13 bit data length (12ST+'0')
Accuracy	± 0,35° typical
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

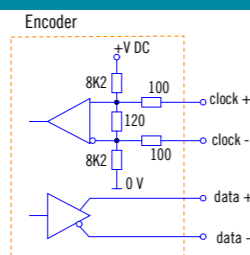
CONNECTIONS

Function	Cable
+ V DC	red
0 V	black
U / D	red / blue
data +	green
data -	brown
clock +	yellow
clock -	orange
RESET	white
⊥	shield

MECHANICAL SPECIFICATIONS

Shaft diameter	Ø 6 mm
Enclosure rating	IP 67 cover side / IP 65 shaft side (IEC 60529)
Rotation speed	8000 rpm continuous / 10000 rpm max
Max shaft load	20 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,001 x 10 ⁻⁶ kgm ² (0,02 x 10 ⁻⁶ lbfm ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	AISI 420 stainless steel
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Weight	150 g (5,29 oz)

SSI SCHEMATICS



MAIN FEATURES

Miniaturized singleturn absolute encoder for limited size applications.

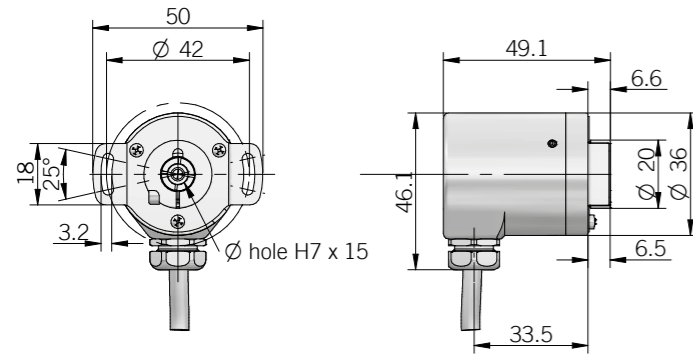
- Magnetic sensor technology without contact (Magnetic ASIC)
- Sturdy construction thanks to separated chambers
- Resolution up to 12 bit (4096 ppr)
- Power supply up to +30 V DC with SSI as electrical interface
- Code reset for easy setup
- Cable output, connector available on cable end
- 6 mm diameter blind hollow shaft
- Mounting by stator coupling or torque pin



ORDERING CODE

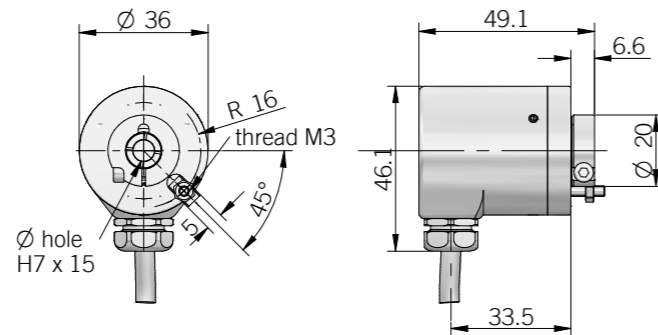
EA	36G	12	G	8/30	S	P	X	6	X	8	P	R	.XXX
SERIES magnetic singleturn absolute encoder series EA													
MODEL blind hollow shaft with stator coupling 36F blind hollow shaft with torque pin 36G													
SINGLETURN RESOLUTION from 1 to 12 bit 360 / 720 ppr please directly contact our offices for other pulses													
CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC													
POWER SUPPLY 5 V DC 5 8 ... 30 V DC 8/30													
ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S													
LOGIC positive P													
OPTIONS to be reported if not used X reset ZE													
BORE DIAMETER mm 6													
ENCLOSURE RATING IP 67 cover side / IP 65 shaft side X													
MAX ROTATION SPEED 8000 rpm 8													
OUTPUT TYPE cable (standard length 0,5 m) P													
DIRECTION TYPE radial R													
VARIANT custom version XXX													

36 F



dimensions in mm

36 G



torque pin is included in model G, for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

Singleturn resolution	from 1 to 12 bit 360 / 720 ppr
Power supply	5 = 4,75 ... 5,25 V DC 8/30 = 7,6 ... 30 V DC (reverse polarity protection)
Power draw without load	< 400 mW
Output type	RS-422 (SN65LBC179Q or equivalent)
Code type	binary or gray
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 µs
SSI pause time (Tp)	> 35 µs
SSI frame	(MSB ... LSB) 13 bit data length (12ST+0')
Accuracy	± 0,35° typical
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

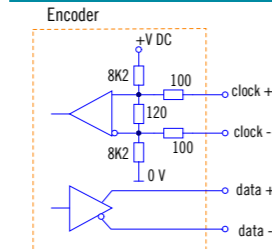
CONNECTIONS

Function	Cable
+ V DC	red
0 V	black
U / D	red/blue
data +	green
data -	brown
clock +	yellow
clock -	orange
RESET	white
⏏	shield

MECHANICAL SPECIFICATIONS

Bore diameter	Ø 6 mm
Enclosure rating	IP 67 cover side / IP 65 shaft side (IEC 60529)
Rotation speed	8000 rpm continuous / 10000 rpm max
Max shaft load	20 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,001 x 10 ⁻⁶ kgm ² (0,02 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminium
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	AISI 420 stainless steel
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +100°C (-4° ... +212°F)
Storage temperature	-20° ... +100°C (-4° ... +212°F)
Fixing torque for collar clamping	0,6 Nm (85 Ozin) recommended
Weight	150 g (5,29 oz)

SSI SCHEMATICS



MAIN FEATURES

Singleturn absolute magnetic encoder size 50 mm with solid shaft

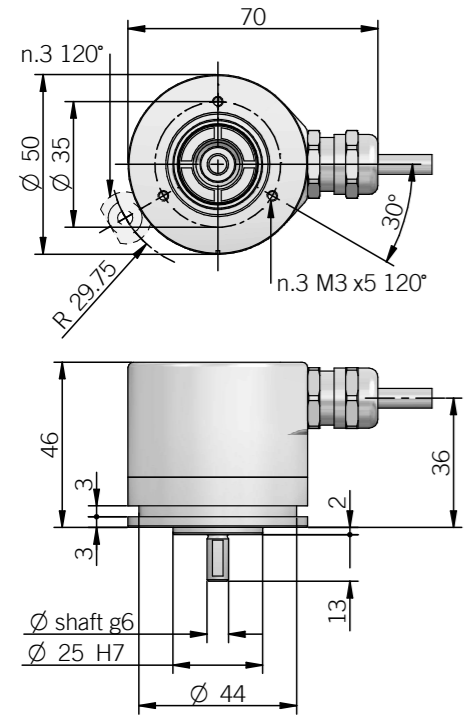
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +30 V DC with SSI or Bit Parallel as electrical interface
- Code reset for easy setup
- Cable or M12 output, other connector available on cable end
- Sturdy construction (separated chambers)
- Solid shaft diameter up to 10 mm
- IP 67 enclosure rating
- Mounting by synchronous flange



ORDERING CODE EMA 50B 1024 G 8/30 N N X 6 X 3 P R .XXX

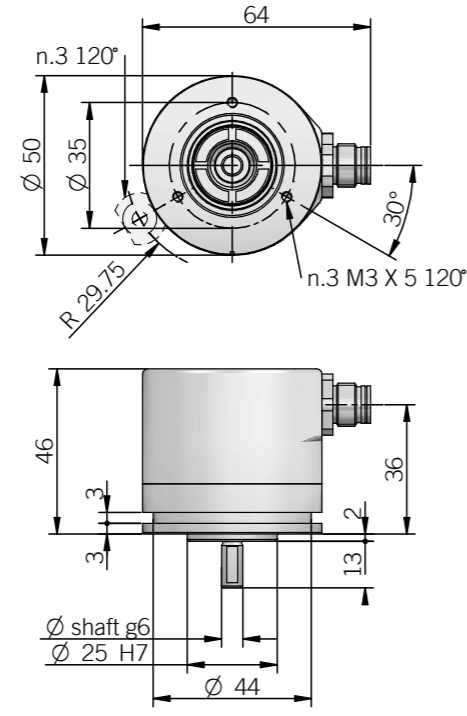
SERIES magnetic singleturn absolute encoder EMA	MODEL synchronous flange Ø 25 mm 50A synchronous flange Ø 30 mm 50B synchronous flange Ø 25 mm anodized 50BY	RESOLUTION (N / C / R / U / P interface) ppr from 2 to 4096 (S interface) ppr from 2 to 8192	CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC	POWER SUPPLY 5 V DC 5 8 ... 30 V DC 8/30	ELECTRICAL INTERFACE NPN N NPN open collector C PNP R PNP open collector U push pull P Serial Synchronous Interface - SSI S	LOGIC negative N positive P	OPTIONS to be reported if not used X reset ZE (with binary or offset binary code) strobe S (with binary or offset binary code) strobe and code reset SZE	SHAFT DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10	ENCLOSURE RATING IP 65 X IP 67 S	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE cable (standard length 0,5 m) P (S interface) M12 connector M12	female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX
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50 A
radial cable output



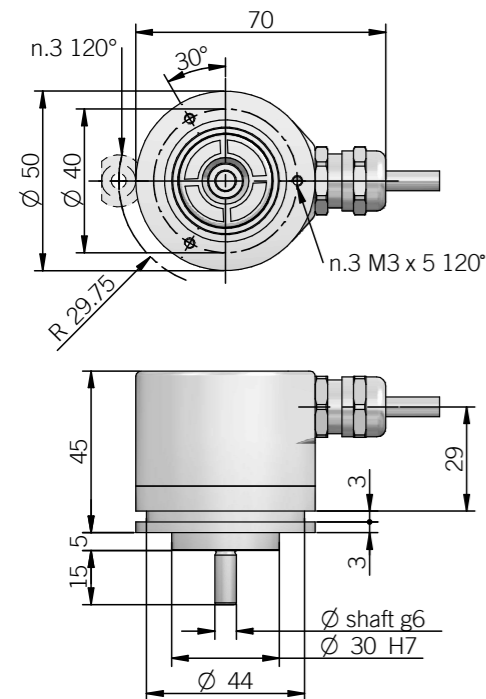
fixing clamps not included, please refer to Accessories section

50 A
radial M12 output



fixing clamps not included, please refer to Accessories section

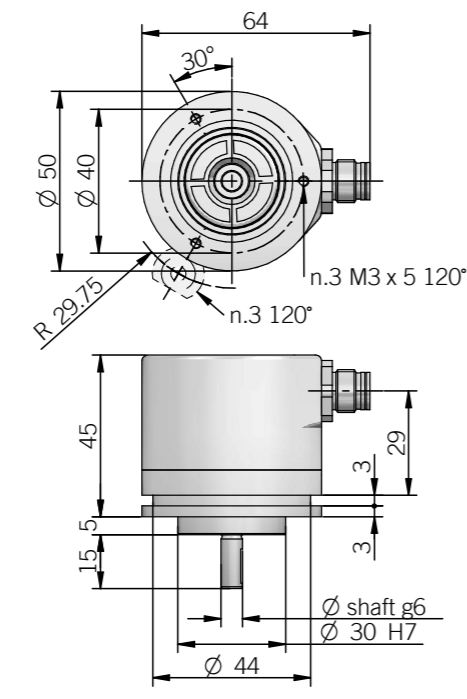
50 B / BY
radial cable output



fixing clamps not included, please refer to Accessories section

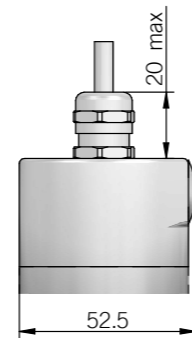
dimensions in mm

50 B / BY
radial M12 output



fixing clamps not included, please refer to Accessories section

Axial output



ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 4096 ppr (N / C / P / R / U interface) from 2 to 8192 ppr (S interface)
Power supply	5 = 4,5 ... 5,5 V DC 8/30 = 7,6 ... 31,5 V DC
Current consumption without load	< 100 mA
Max load current	20 mA / channel (push pull) 40 mA / channel (NPN / PNP)
Output type*	NPN / NPN open collector (ULN2003A) PNP / PNP open collector (TD62783) push pull (ic-DL) RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Max frequency	output: 25 kHz LSB (Bit parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	20 μs
SSI pause time (Tp)	> 35 μs
Strobe time	20 μs
Accuracy	± 0,35° typical
SSI frame	(MSB ... LSB) 13 bit data length
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

BIT PARALLEL CONNECTIONS

Function	Gray / Binary	Cable
bit 1 (LSB)	G ⁰ / B ⁰	green
bit 2	G ¹ / B ¹	yellow
bit 3	G ² / B ²	blue
bit 4	G ³ / B ³	brown
bit 5	G ⁴ / B ⁴	orange or pink
bit 6	G ⁵ / B ⁵	white
bit 7	G ⁶ / B ⁶	grey
bit 8	G ⁷ / B ⁷	violet
bit 9	G ⁸ / B ⁸	grey / pink
bit 10	G ⁹ / B ⁹	white / green
bit 11	G ¹⁰ / B ¹⁰	brown / green
bit 12	G ¹¹ / B ¹¹	white / yellow
0 V	/	black
+ V DC	/	red
U / D	/	red / blue
RESET	/	yellow / brown
STROBE	/	white / grey
⊥	/	shield

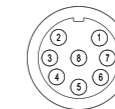
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 65 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	3000 rpm continuous / 5000 rpm instantaneous
Max shaft load	30 N axial / 50 N radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-25° ... +85°C (-13° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	200 g (7,05 oz)

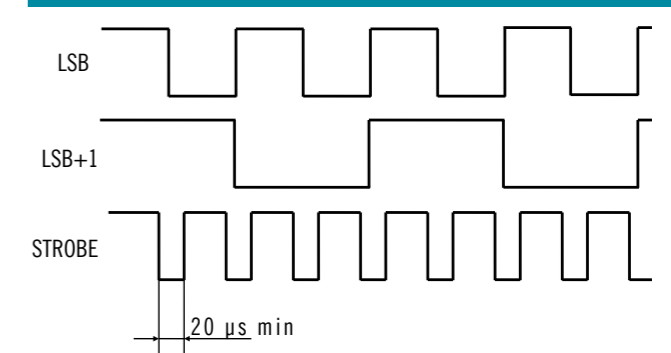
SSI CONNECTIONS

Function	Cable	8 pin M12
+ V DC	red	8
0 V	black	5
data +	green	3
data -	brown	2
clock +	yellow	4
clock -	orange or pink	6
U / D	red / blue	7
RESET	white	1
⊥	shield	housing

M12 connector (8 pin)
M12 A coded
solder side view FV



STROBE TIMING



MAIN FEATURES

Singleturn absolute magnetic encoder size 50 mm with blind hollow shaft

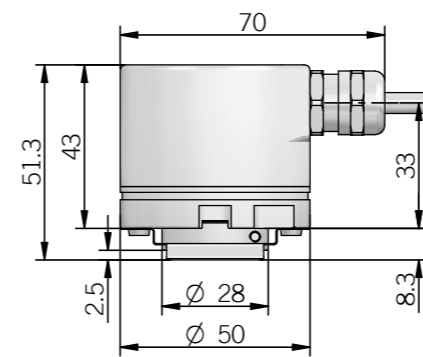
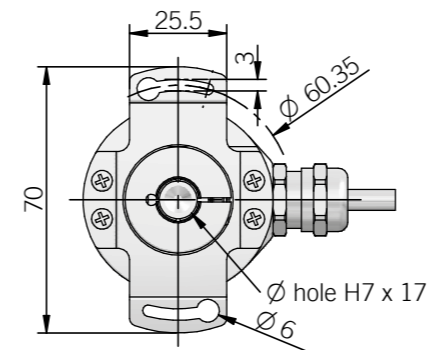
- Resolution up to 13 bit (8192 ppr)
- Power supply up to +30 V DC with SSI or Bit Parallel as electrical interface
- Code reset for easy setup
- Cable or M12 output, other connector available on cable end
- Sturdy construction (separated chambers)
- Blind hollow shaft diameter up to 15 mm
- IP 67 enclosure rating
- Mounting by stator coupling or torque pin



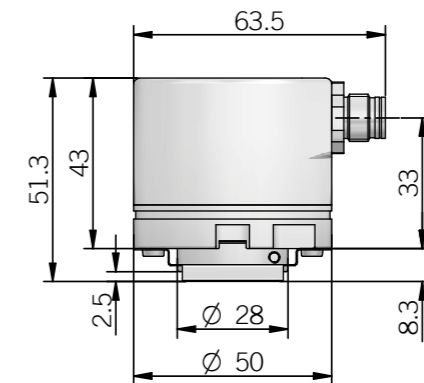
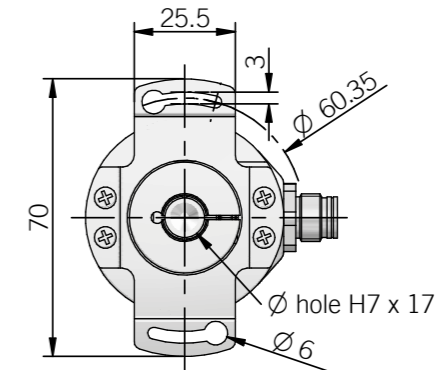
ORDERING CODE

EMA	50F	1024	G	8/30	N	N	X	6	X	3	P	R	.XXX
<p>SERIES magnetic singleturn absolute encoder EMA</p> <p>MODEL blind hollow shaft with stator coupling 50F blind hollow shaft with torque pin 50G</p> <p>RESOLUTION (N / C / R / U / P interface) ppr from 2 to 4096 (S interface) ppr from 2 to 8192</p> <p>CODE TYPE binary B gray G (no powers of 2) binary offset code (0-XXX) BC (no powers of 2) gray offset code (0-XXX) GC</p> <p>POWER SUPPLY 5 V DC 5 8 ... 30 V DC 8/30</p> <p>ELECTRICAL INTERFACE NPN N NPN open collector C PNP R PNP open collector U push pull P Serial Synchronous Interface - SSI S</p> <p>LOGIC negative N positive P</p> <p>OPTIONS to be reported if not used X reset ZE (with binary or offset binary code) strobe S (with binary or offset binary code) strobe and code reset SZE</p> <p>BORE DIAMETER mm 6 mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15</p> <p>ENCLOSURE RATING IP 65 X IP 67 S</p> <p>MAX ROTATION SPEED 3000 rpm 3</p> <p>OUTPUT TYPE cable (standard length 0,5 m) P (S interface) M12 connector M12 female connector included, without female please add 162 as variant code</p> <p>DIRECTION TYPE axial A radial R</p> <p>VARIANT custom version XXX</p>													

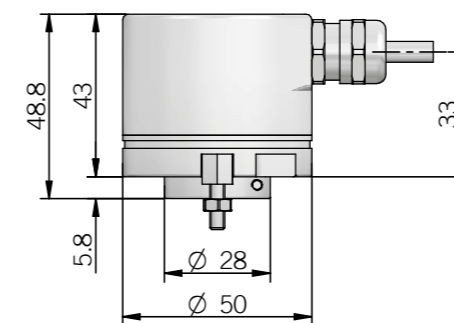
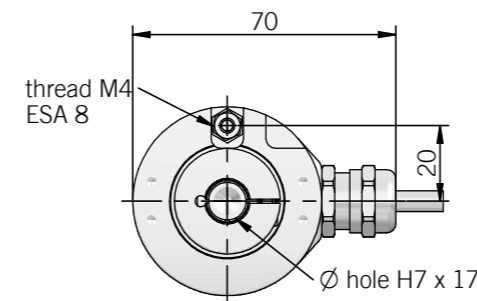
50 F
radial cable output



50 F
radial M12 output

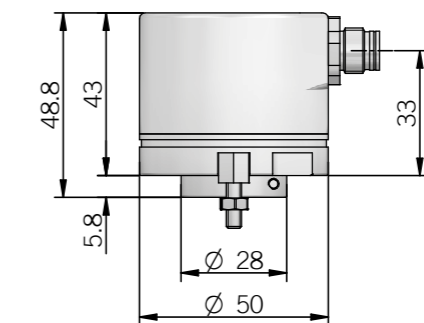
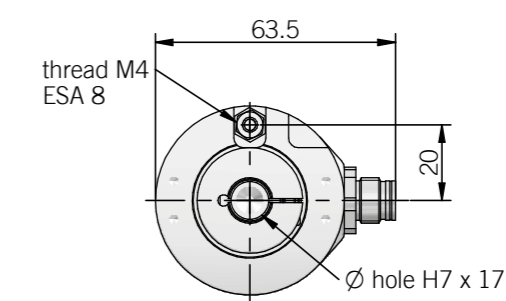


50 G
radial cable output

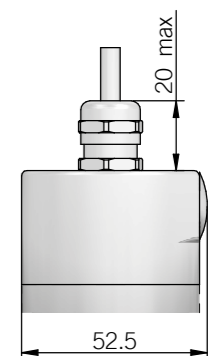


torque pin is included in model G, for mounting instruction please refer to product installation notes
dimensions in mm

50 G
radial M12 output



Axial output



ELECTRICAL SPECIFICATIONS

Resolution	from 2 to 4096 ppr (N / C / P / R / U interface) from 2 to 8192 ppr (S interface)
Power supply	5 = 4,5 ... 5,5 V DC 8/30 = 7,6 ... 31,5 V DC
Current consumption without load	< 100 mA
Max load current	20 mA / channel (push pull) 40 mA / channel (NPN / PNP)
Output type*	NPN / NPN open collector (ULN2003A) PNP / PNP open collector (TD62783) push pull (iC-DL) RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Max frequency	output: 25 kHz LSB (Bit parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	20 μs
SSI pause time (Tp)	> 35 μs
Strobe time	20 μs
Accuracy	± 0,35° typical
SSI frame	(MSB ... LSB) 13 bit data length
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

BIT PARALLEL CONNECTIONS

Function	Gray / Binary	Cable
bit 1 (LSB)	G ⁰ / B ⁰	green
bit 2	G ¹ / B ¹	yellow
bit 3	G ² / B ²	blue
bit 4	G ³ / B ³	brown
bit 5	G ⁴ / B ⁴	orange or pink
bit 6	G ⁵ / B ⁵	white
bit 7	G ⁶ / B ⁶	grey
bit 8	G ⁷ / B ⁷	violet
bit 9	G ⁸ / B ⁸	grey / pink
bit 10	G ⁹ / B ⁹	white / green
bit 11	G ¹⁰ / B ¹⁰	brown / green
bit 12	G ¹¹ / B ¹¹	white / yellow
0 V	/	black
+ V DC	/	red
U / D	/	red / blue
RESET	/	yellow / brown
STROBE	/	white / grey
⊥	/	shield

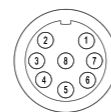
MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6* / 8* / 9,52* (3/8") / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	X = IP 65 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	3000 rpm continuous
Max shaft load	30 N axial / 50 N radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-25° ... +85°C (-13° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	200 g (7,05 oz)

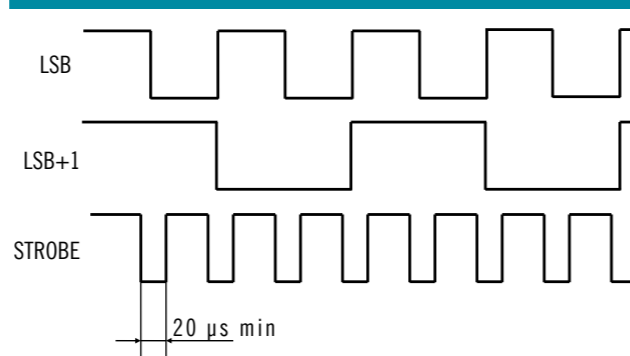
SSI CONNECTIONS

Function	Cable	8 pin M12
+ V DC	red	8
0 V	black	5
data +	green	3
data -	brown	2
clock +	yellow	4
clock -	orange or pink	6
U / D	red / blue	7
RESET	white	1
⊥	shield	housing

M12 connector (8 pin)
M12 A coded
solder side view FV



STROBE TIMING



MAIN FEATURES

Singleturn absolute magnetic encoder size 50 mm with solid shaft

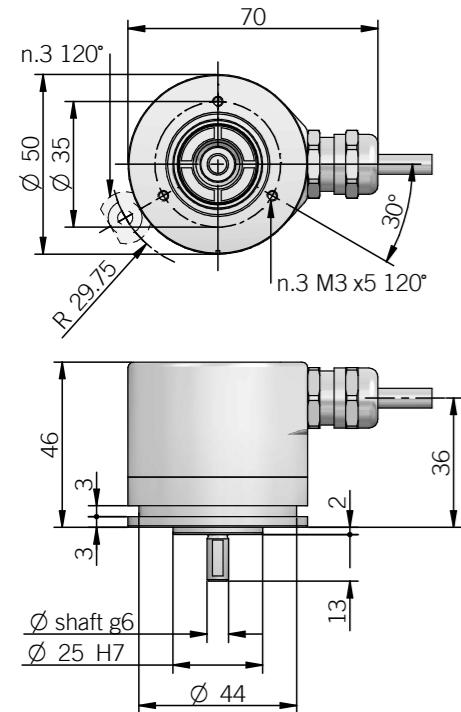
- Resolution 12 bit
- Power supply up to +28 V DC with analogue (voltage or current) as electrical interface
- Code reset for easy setup
- Cable or M12 output, other connector available on cable end
- Sturdy construction (separated chambers)
- Solid shaft diameter up to 10 mm
- IP 67 enclosure rating
- Mounting by synchronous flange



ORDERING CODE EML 50A 360 X 12/28 V 05 X 6 X 3 P R .XXX

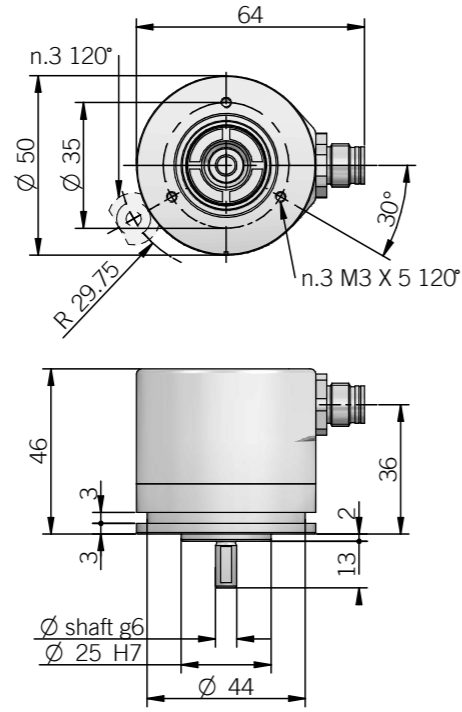
DESCRIPTION	CODE
SERIES	EML
MODEL	50A 50B 50BY
ACTIVE ANGLE	360 270 180 90
OPTION	X ZE
POWER SUPPLY	12 ... 28 V DC 12/28
ELECTRICAL INTERFACE	V I
OUTPUT RANGE	0 ... 5 V 05 0 ... 10 V 010 0 ... 20 mA 020 4 ... 20 mA 420
OPTIONS	X Q
SHAFT DIAMETER	6 8 9 10
ENCLOSURE RATING	IP 65 X IP 67 S
MAX ROTATION SPEED	3000 rpm 3
OUTPUT TYPE	P M12
DIRECTION TYPE	A R
VARIANT	XXX

50 A
radial cable output



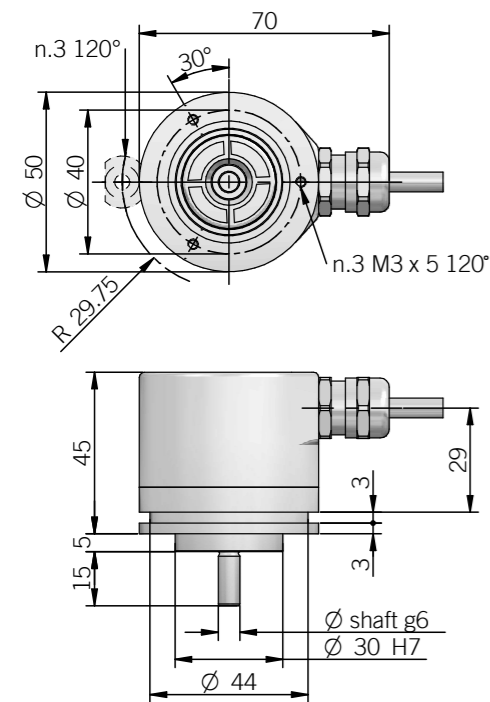
fixing clamps not included, please refer to Accessories section

50 A
radial M12 output



fixing clamps not included, please refer to Accessories section

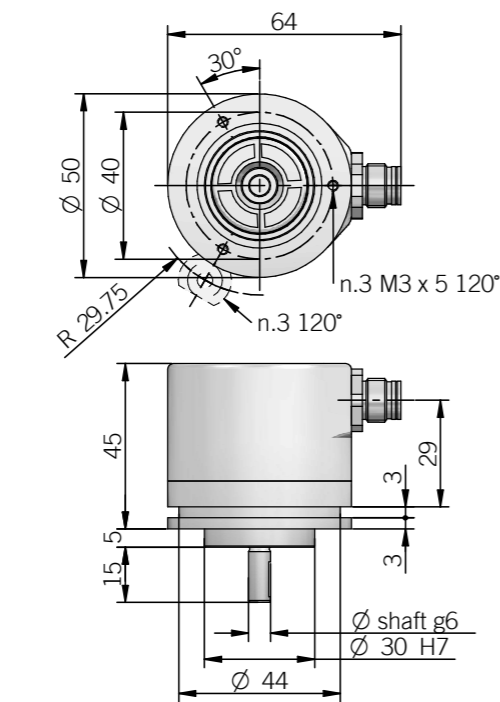
50 B / BY
radial cable output



fixing clamps not included, please refer to Accessories section

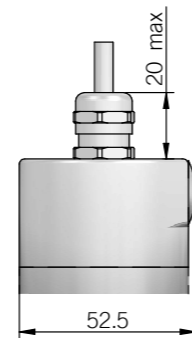
dimensions in mm

50 B / BY
radial M12 output



fixing clamps not included, please refer to Accessories section

Axial output



ELECTRICAL SPECIFICATIONS

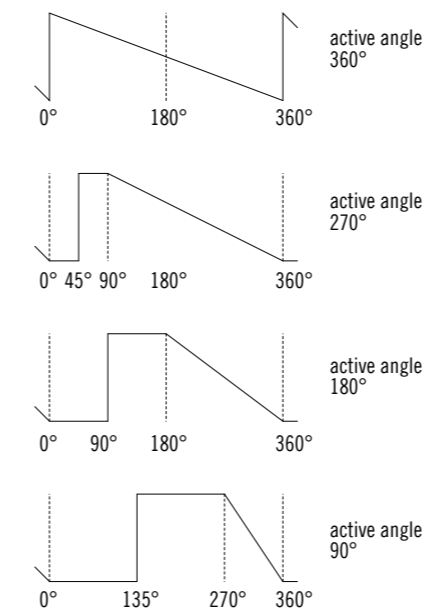
Resolution	12 bit per revolution
Output update frequency	100 kHz
Active angle	90 ... 360 mechanical degrees
Power supply	11,4 ... 29,4 V DC (reverse polarity protection)
Current consumption without load	40 mA max
Output type	voltage (0 ... 5 V / 0 ... 10 V) current (0 ... 20 mA / 4 ... 20 mA)
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Load	R _{min} = 1 kΩ (voltage output) R _{max} = (V _{DC} - 2) / 0.02 (current output)
Linearity error	< 1 %
Signal pattern	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

CONNECTIONS

Function	Cable (voltage)	Cable (current)	5 pin M12	8 pin M12*
+ V DC	red	red	2	8
0 V	black	black	4	5
V _{out}	green	/	3	/
I _{in}	/	yellow	3	3
I _{out}	/	green	/	2
U / D	blue	blue	5	7
RESET	white	white	1	1
⊥	shield	shield	housing	housing

* with Q current output

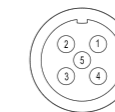
SIGNAL PATTERN (decreasing CW)



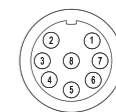
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 65 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	3000 rpm continuous / 5000 rpm peak
Max shaft load	30 N axial / 50 N radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,5 x 10 ⁻⁶ kgm ² (12 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-25° ... +85°C (-13° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Weight	200 g (7,05 oz)

M12 connector (5 pin)
M12 A coded
solder side view FV

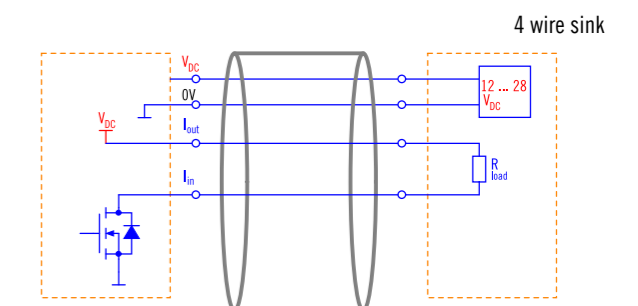
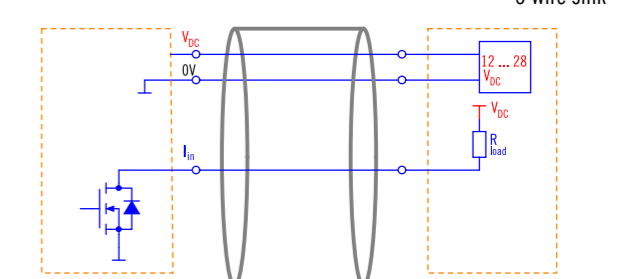


M12 connector (8 pin)
M12 A coded
solder side view FV

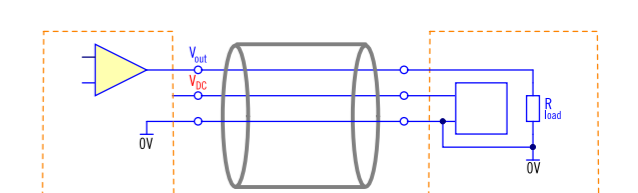


ELECTRICAL INTERFACE

Current output



Voltage output



BLIND HOLLOW SHAFT MAGNETIC SINGLETURN ABSOLUTE ENCODER

MAIN FEATURES

Singleturn absolute magnetic encoder size 50 mm with blind hollow shaft

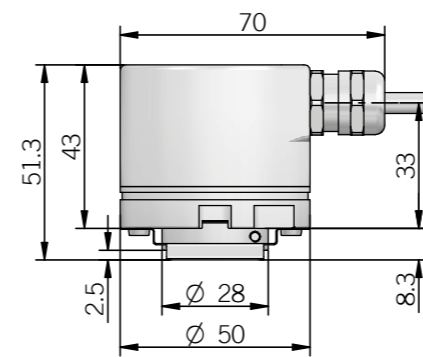
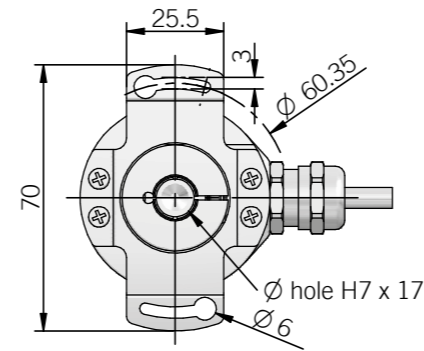
- Resolution 12 bit
- Power supply up to +28 V DC with analogue (voltage or current) as electrical interface
- Code reset for easy setup
- Cable or M12 output, other connector available on cable end
- Sturdy construction (separated chambers)
- Blind hollow shaft diameter up to 15 mm
- IP 67 enclosure rating
- Mounting by stator coupling or torque pin



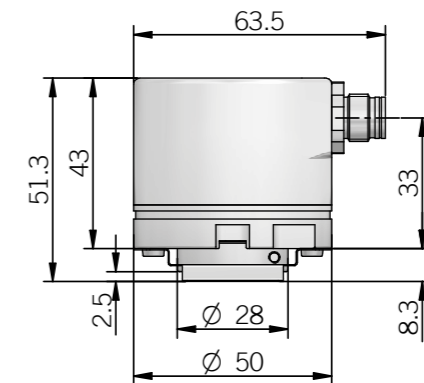
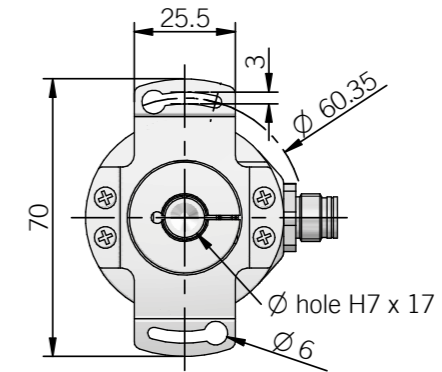
ORDERING CODE

ORDERING CODE	EML	50F	360	X	12/28	V	05	X	6	X	3	P	R	.XXX
SERIES analogue magnetic singleturn absolute encoder	EML													
MODEL blind hollow shaft with stator coupling blind hollow shaft with torque pin		50F 50G												
ACTIVE ANGLE degrees			360 270 180 90											
OPTION to be reported if not used				X ZE										
POWER SUPPLY 12 ... 28 V DC			12/28											
ELECTRICAL INTERFACE voltage current					V I									
OUTPUT RANGE 0 ... 5 V 0 ... 10 V 0 ... 20 mA 4 ... 20 mA			05 10 020 420											
OPTIONS to be reported with voltage output / 3 wires current output 4 wires current output				X Q										
BORE DIAMETER mm (3/8")			6 8 9.52 10 12 14 15											
ENCLOSURE RATING IP 65 IP 67			X S											
MAX ROTATION SPEED 3000 rpm			3											
OUTPUT TYPE cable (standard length 0.5 m) M12 connector			P M12											
female connector included, without female please add 162 as variant code														
DIRECTION TYPE axial radial													A R	
VARIANT custom version														XXX

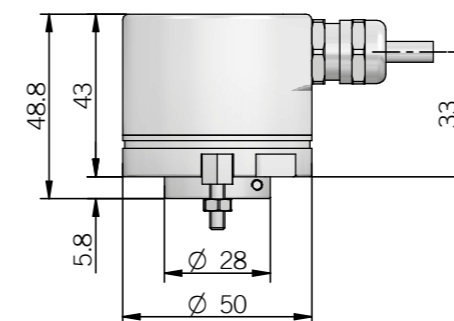
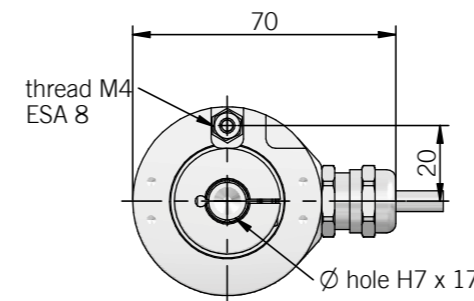
50 F
radial cable output



50 F
radial M12 output

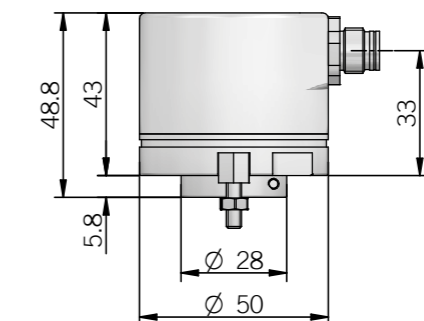
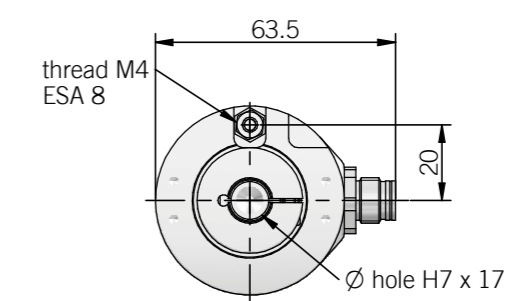


50 G
radial cable output

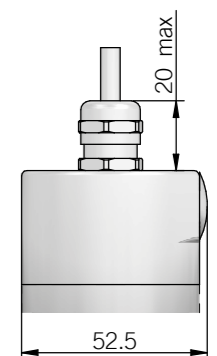


torque pin is included in model G, for mounting instruction please refer to product installation notes
dimensions in mm

50 G
radial M12 output



Axial output



ELECTRICAL SPECIFICATIONS

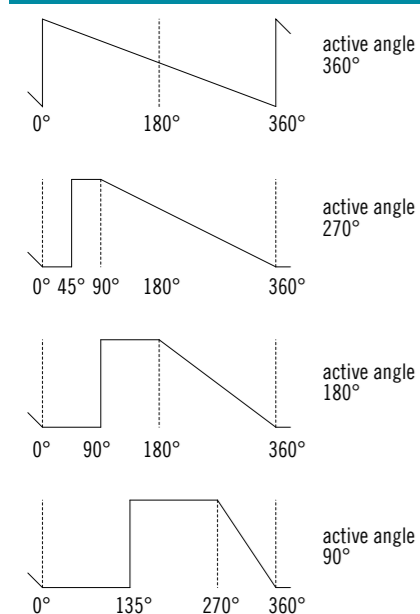
Resolution	12 bit per revolution
Output update frequency	100 kHz
Active angle	90 ... 360 mechanical degrees
Power supply	11,4 ... 29,4 V DC (reverse polarity protection)
Current consumption without load	40 mA max
Output type	voltage (0 ... 5 V / 0 ... 10 V) current (0 ... 20 mA / 4 ... 20 mA)
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset tmin 150 ms
Load	R _{min} = 1 kΩ (voltage output) R _{max} = (V _{DC} - 2) / 0.02 (current output)
Linearity error	< 1 %
Signal pattern	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

CONNECTIONS

Function	Cable (voltage)	Cable (current)	5 pin M12	8 pin M12*
+ V DC	red	red	2	8
0 V	black	black	4	5
V _{out}	green	/	3	/
I _{in}	/	yellow	3	3
I _{out}	/	green	/	2
U / D	blue	blue	5	7
RESET	white	white	1	1
⊥	shield	shield	housing	housing

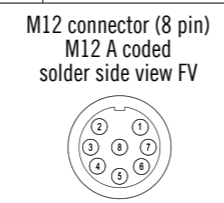
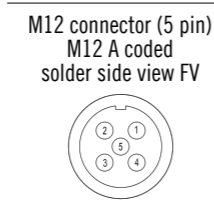
* with Q current output

SIGNAL PATTERN (decreasing CW)

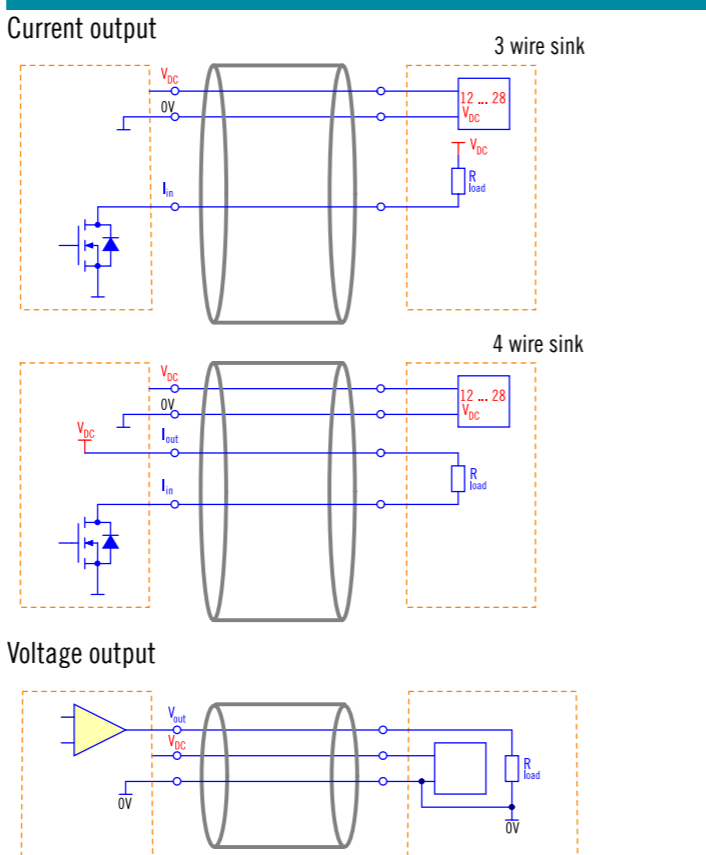


MECHANICAL SPECIFICATIONS

Bore diameter	∅ 6* / 8* / 9,52* (3/8") / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	X = IP 65 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	3000 rpm continuous
Max shaft load	30 N axial / 50 N radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	4 x 10 ⁻⁶ kgm ² (95 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-25° ... +85°C (-13° ... +185°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	200 g (7,05 oz)



ELECTRICAL INTERFACE



MAIN FEATURES

EM series encoders are suitable for several application fields like electric motors, textile machines, wood-working, paper-working, glass working, marble-working machinery and, more generally, automation and process control fields.

- Resolution up to 13 bit (8192 ppr) with SSI as electrical interface
- Cable or M12 output, other connector available on cable end
- No wear due to no contact magnetic technology
- Bore shaft diameter up to 10 mm
- Enclosure rating up to IP67
- Wide operating temperature -40° ... +100°C (-40° ... +212°F)



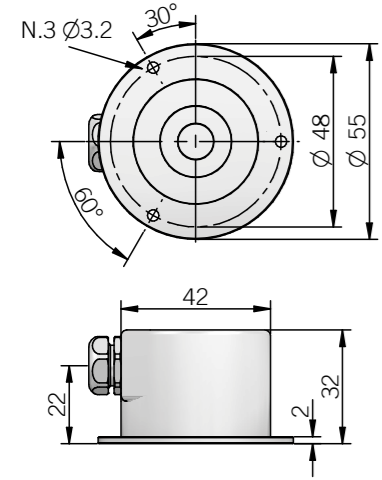
ORDERING CODE

EMA	55A	1024	B	5	S	P	X	6	X	10	P	R	.XXX
SERIES magnetic singleturn absolute encoder EMA		MODEL fixing holes ∅ 48 mm 55A fixing holes ∅ 48 mm anodized 55AY		RESOLUTION ppr from 8 to 8192 see table for pulses availability		CODE TYPE binary B gray G		POWER SUPPLY 5 V DC 5 8 ... 30 V DC 8/30		ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S		LOGIC positive P	
OPTIONS to be reported X		BORE DIAMETER (MAGNET ACTUATOR) mm 6 mm 8 (3/8") 9,52 mm 9 mm 10		ENCLOSURE RATING IP 65 X IP 67 S		MAX ROTATION SPEED 10000 rpm 10		OUTPUT TYPE cable (standard length 0,5 m) P M12 connector M12		DIRECTION TYPE axial A radial R		VARIANT custom version XXX	

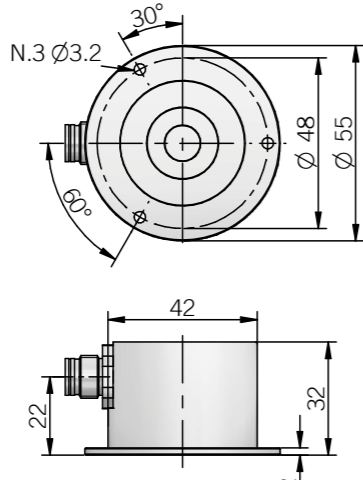


EAM 58 B / C - 63 A / D / E
BIT PARALLEL - SSI
SHAFT MULTITURN ABSOLUTE ENCODER

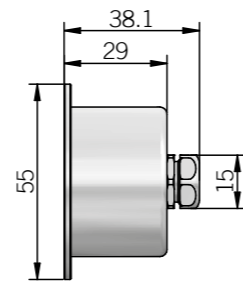
55 A radial cable output



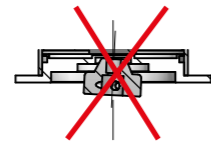
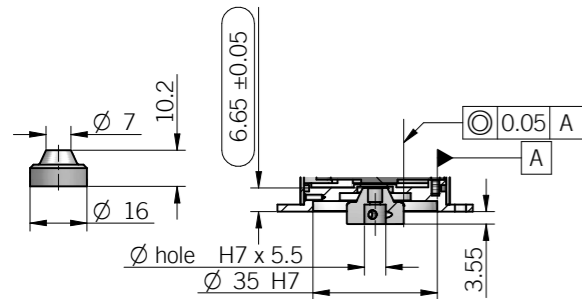
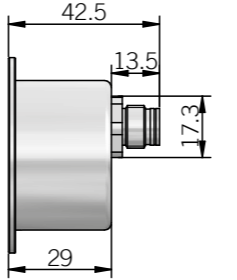
55 A radial M12 output



55 A axial cable output



55 A axial M12 output



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 8 to 8192 ppr
Power supply	5 = 4,75 ... 5,25 V DC 8/30 = 7,6 ... 31,5 V DC
Power draw without load	800 mW max
Output type	RS-422 (SN65LBC179Q or equivalent)
SSI output code	binary or gray
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 µs
SSI frame	(MSB ... LSB) 13 bit data length
Accuracy	± 0,35° typical / ± 0,50° max
Counting direction	decreasing clockwise (magnet actuator view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS

Function	Cable	8 pin M12
+ V DC	red	8
0 V	black	5
data +	green	3
data -	brown	2
clock +	yellow	4
clock -	orange or pink	6
⊥	shield	housing

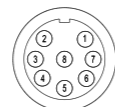
MECHANICAL SPECIFICATIONS

Bore diameter (magnet actuator)	Ø 6 / 8 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 65 (IEC 60529) S = IP 67 (IEC 60529)
Max rotation speed	10000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia (magnet actuator)	0,1 x 10 ⁻⁶ kgm ² (2,4 x 10 ⁻⁶ lbfm ²)
Bearing stage material	EN-AW 2011 aluminum
Housing material	painted aluminium
Magnet actuator material	EN-AW 2011 aluminum
Operating temperature	-40° ... +100 °C (-40° ... +212°F)
Storage temperature	-25° ... +85 °C (-13° ... +185°F)
Weight	150 g (5,29 oz)
Magnet actuator mounting tolerances (to get best electrical performances)	± 0,2 mm (axial) ± 0,1 mm (radial)

RESOLUTIONS

8 - 16 - 25 - 32 - 40 - 50 - 64 - 80 - 100 - 125 - 128 - 160 - 200 - 250 - 256 - 320 - 400 - 500 - 512 - 800 - 1000 - 1024 - 1600 - 2000 - 2048 - 4096 - 8192

M12 connector (8 pin)
M12 A coded
solder side view FV



MAIN FEATURES

Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- Resolution up to 27 bit (13 bit single turn (8192 ppr) + 14 bit multiturn (16384 turns))
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Cable or connector output
- Solid shaft diameter up to 10 mm
- Mounting by synchronous, clamping or centering 2,5" square flange

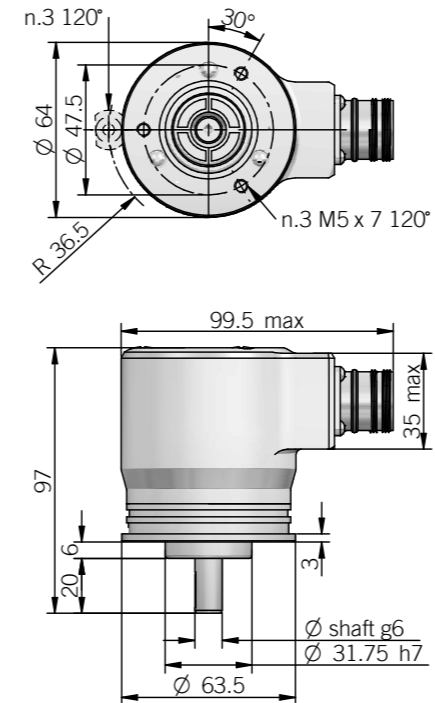


ORDERING CODE BIT PARALLEL EAM 63A R 512/512 G 8/28 P P X 10 X 6 PE R .XXX

PARAMETER	CODE	DESCRIPTION
SERIES	EAM	multiturn absolute encoder
MODEL	63A	synchronous flange Ø 31.75 mm
	58B	synchronous flange Ø 50 mm
	58C	clamping flange Ø 36 mm
	63D	centering square flange Ø 31.75 mm
	63E	centering square flange Ø 50 mm
REV.	2.0 R	
MULTITURN RESOLUTION		(powers of 2) turns from 2 to 16384
SINGLETURN RESOLUTION		(powers of 2) ppr from 2 to 8192
CODE TYPE	B	binary
	G	gray
POWER SUPPLY	8/28	8 ... 28 V DC
ELECTRICAL INTERFACE	P	push-pull
LOGIC	N	negative
	P	positive
OPTIONS	L	latch
	X	to be reported if not used
SHAFT DIAMETER	6	(mod. 58 B) mm
	9	(mod. 63 A / D) (3/8") 9,52 mm
	10	(mod. 58 C - 63 A / D / E) mm
ENCLOSURE RATING	S	IP 66
	X	IP 54
MAX ROTATION SPEED	3	(IP 66) 3000 rpm
	6	(IP 54) 6000 rpm
OUTPUT TYPE	PD	(up to 13 bit as total resolution) 16 cores cable (standard length 1,5 m)
	PE	(from 14 to 27 bit as total resolution or with latch option) 32 cores cable (standard length 1,5 m)
	MA	(up to 13 bit as total resolution) 19 pin MIL connector
	ME	(from 14 to 27 bit as total resolution) 32 pin MIL connector
		female connector included, without female please add 162 as variant code
DIRECTION TYPE	A	axial
	R	radial
VARIANT	XXX	custom version

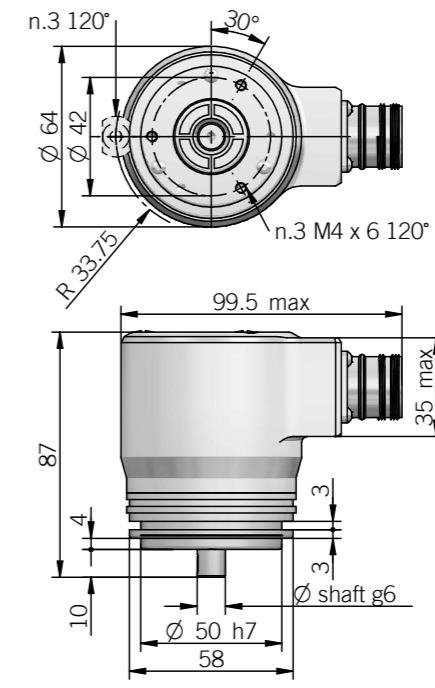
ORDERING CODE	EAM	63A	R	4096 / 4096	G	8/28	S	X	X	10	X	3	MC	R	.XXX
SSI															
SERIES	multiturn absolute encoder EAM														
MODEL	synchronous flange \varnothing 31.75 mm 63A synchronous flange \varnothing 50 mm 58B clamping flange \varnothing 36 mm 58C centering square flange \varnothing 31.75 mm 63D centering square flange \varnothing 50 mm 63E														
	rev. 2.0 R														
MULTITURN RESOLUTION	(powers of 2) turns from 2 to 16384														
SINGLETURN RESOLUTION	ppr 4096 / 8192														
CODE TYPE	binary B gray G														
POWER SUPPLY	8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE	Serial Synchronous Interface - SSI S														
LOGIC	to be reported X														
OPTIONS	to be reported X														
SHAFT DIAMETER	(mod. 58 B) mm 6 (mod. 63 A / D) (3/8") 9,52 mm 9 (mod. 58 C - 63 A / D / E) mm 10														
ENCLOSURE RATING	IP 54 X IP 66 S														
MAX ROTATION SPEED	(IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6														
OUTPUT TYPE	cable (standard length 1,5 m) PC 7 pin MIL connector MC 12 pin M23 connector HA 8 pin M12 connector M12														
	female connector included, without female please add 162 as variant code														
DIRECTION TYPE	axial A radial R														
VARIANT	custom version XXX														

63 A



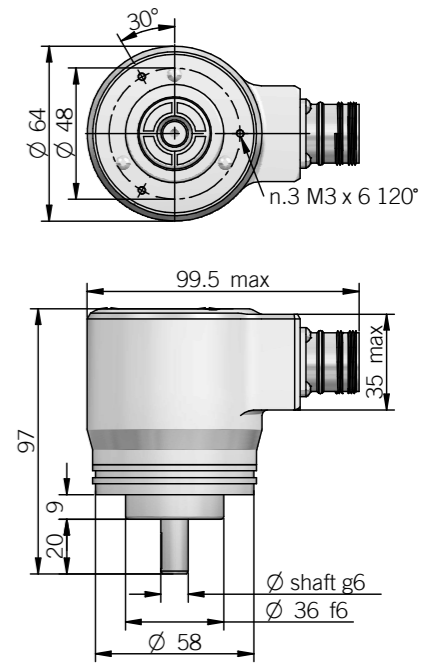
fixing clamps not included, please refer to Accessories section

58 B

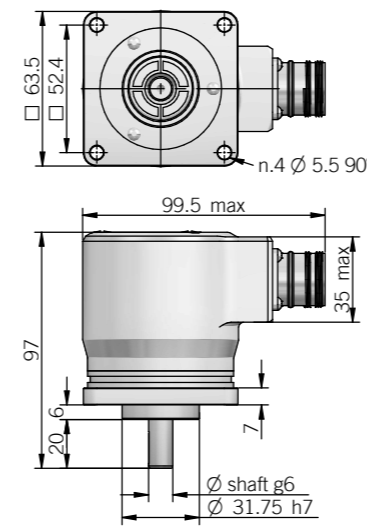


fixing clamps not included, please refer to Accessories section

58 C

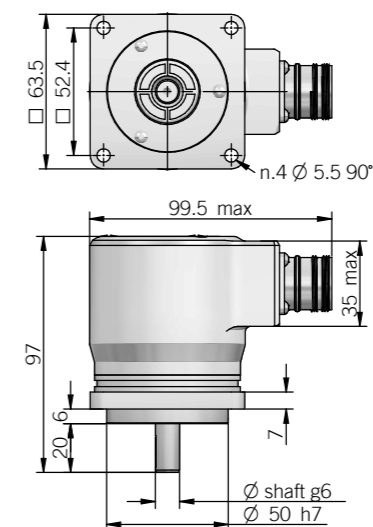


63 D

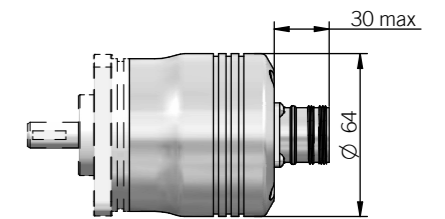


dimensions in mm

63 E



Dimensions with axial output



ELECTRICAL SPECIFICATIONS

Multiturn resolution	from 2 to 16384 turns
Singleturn resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (iC-HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch)	active high (+V DC) connect to 0 V if not used
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	18 μs
SSI pause time (Tp)	> 35 μs
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 13ST) 13 to 14 bit multiturn = length 27 bit (14MT + 13ST)
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

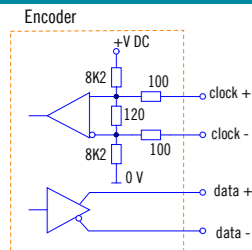
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	10 N axial / 20 N radial with ø6 shaft 100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbfft ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painting aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	500 g (17,64 oz)

BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA	32 pin ME
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A	A
bit 2	B ¹ / G ¹	yellow	yellow	B	B
bit 3	B ² / G ²	blue	blue	C	C
bit 4	B ³ / G ³	brown	brown	D	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E	E
bit 6	B ⁵ / G ⁵	white	white	F	F
bit 7	B ⁶ / G ⁶	grey	grey	G	G
bit 8	B ⁷ / G ⁷	purple	purple	H	H
bit 9	B ⁸ / G ⁸	grey / pink	grey / pink	J	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N	N
bit 14	B ¹³ / G ¹³	/	white / grey	/	P
bit 15	B ¹⁴ / G ¹⁴	/	grey / brown	/	R
bit 16	B ¹⁵ / G ¹⁵	/	white / pink	/	S
bit 17	B ¹⁶ / G ¹⁶	/	pink / brown	/	T
bit 18	B ¹⁷ / G ¹⁷	/	white / blue	/	U
bit 19	B ¹⁸ / G ¹⁸	/	brown / blue	/	V
bit 20	B ¹⁹ / G ¹⁹	/	white / red	/	W
bit 21	B ²⁰ / G ²⁰	/	brown / red	/	X
bit 22	B ²¹ / G ²¹	/	white / black	/	Y
bit 23	B ²² / G ²²	/	brown / black	/	Z
bit 24	B ²³ / G ²³	/	grey / green	/	a
bit 25	B ²⁴ / G ²⁴	/	yellow / pink	/	b
bit 26	B ²⁵ / G ²⁵	/	yellow / blue	/	c
bit 27	B ²⁶ / G ²⁶	/	green / blue	/	d
LATCH	/	/	yellow / grey	R	e
0 V	/	black	black	T	j
U / D	/	red / blue	red / blue	U	g
+ V DC	/	red	red	V	h
⊥	/	shield	shield	S	housing

SSI SCHEMATICS



BIT PARALLEL CONNECTOR OR CABLE CHOICE

According to the resolution and the chosen number of turns is possible to calculate the connections required by the connector or the cable. From the below table is possible to know the connection number.

EXAMPLE 1:
256 PPR = 8 connections
N° turns 32 = 5 connections
Total connections 13.

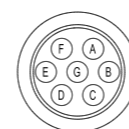
EXAMPLE 2:
4096 PPR = 12 connections
N° turns 4096 = 12 connections
Total connections 24.

From 1 to 13 connections a 16 cores cable (PD) or a 19 cores connector (MA) have to be considered.
From 14 to 27 connections a 32 cores cable (PE) or a 32 cores connector (ME) have to be considered.
If LATCH is used a cable or a 32 poles connector is required.

SSI CONNECTIONS

Function	Cable PC	7 pin MC	12 pin HA	8 pin M12
+ V DC	red	G	8	8
0 V	black	F	1	5
data +	green	C	2	3
data -	brown	D	10	2
clock +	yellow	A	3	4
clock -	orange or pink	B	11	6
U / D	red / blue	E	5	7
⊥	shield	housing	9	housing

MC connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



HA connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



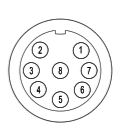
MA connector (19 pin)
Amphenol 62IN 12E 14-19 P
solder side view FV



ME connector (32 pin)
Glenair IPT 02 A 18-32 P F6
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



EAM 58 F - 63 F / G BIT PARALLEL - SSI

BLIND HOLLOW SHAFT MULTITURN ABSOLUTE ENCODER

MAIN FEATURES

Industry standard multiturn absolute encoder for factory automation applications.



- Optical sensor technology (OptoASIC + gears)
- Resolution up to 27 bit (13 bit single turn (8192 ppr) + 14 bit multiturn (16384 turns))
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Cable or connector output
- Blind hollow shaft diameter up to 15 mm
- Mounting by stator coupling, spring or torque pin



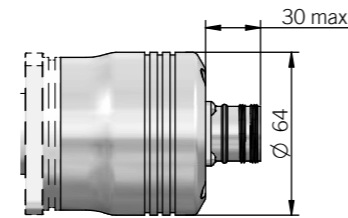
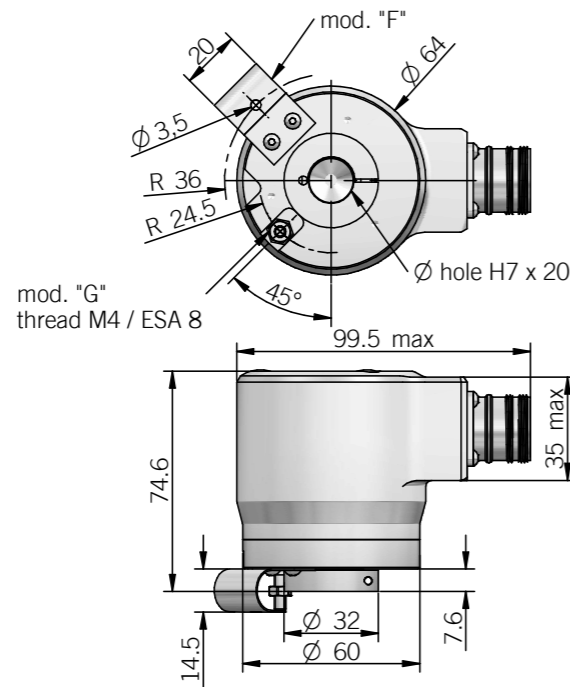
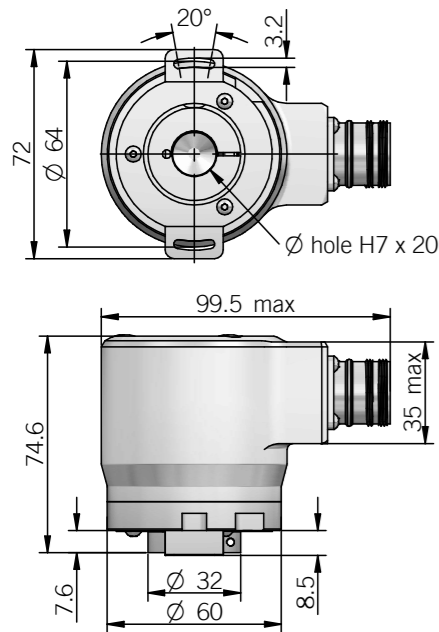
ORDERING CODE	EAM	63G	R	4096 / 4096	G	8/28	P	P	X	8	X	3	PD	R	.XXX
SERIES	multiturn absolute encoder EAM														
MODEL	blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G														
	rev. 2.0 R														
MULTITURN RESOLUTION	(powers of 2) from 2 to 16384 turns														
SINGLETURN RESOLUTION	(powers of 2) ppr from 2 to 8192														
CODE TYPE	binary B gray G														
POWER SUPPLY	8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE	push-pull P														
LOGIC	negative N positive P														
OPTIONS	latch L to be reported if not used X														
BORE DIAMETER	mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15														
ENCLOSURE RATING	IP 54 X														
MAX ROTATION SPEED	3000 rpm 3														
OUTPUT TYPE	(up to 13 bit as total resolution) 16 cores cable (standard length 1,5 m) PD (from 14 to 27 bit as total resolution or with latch option) 32 cores cable (standard length 1,5 m) PE (up to 13 bit as total resolution) 19 pin MIL connector MA (from 14 to 27 bit as total resolution) 32 pin MIL connector ME female connector included, without female please add 162 as variant code														
DIRECTION TYPE	axial A radial R														
VARIANT	custom version XXX														

ORDERING CODE	EAM	63G	R	4096 / 4096	G	8/28	S	X	X	8	X	3	PC	R	.XXX
SERIES	multiturn absolute encoder EAM														
MODEL	blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G														
	rev. 2.0 R														
MULTITURN RESOLUTION	(powers of 2) from 2 to 16384 turns														
SINGLETURN RESOLUTION	ppr 4096 / 8192														
CODE TYPE	binary B gray G														
POWER SUPPLY	8 ... 28 V DC 8/28														
ELECTRICAL INTERFACE	Serial Synchronous Interface - SSI S														
LOGIC	to be reported X														
OPTIONS	to be reported X														
BORE DIAMETER	mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15														
ENCLOSURE RATING	IP 54 X														
MAX ROTATION SPEED	3000 rpm 3														
OUTPUT TYPE	cable (standard length 1,5 m) PC 7 pin MIL connector MC 12 pin M23 connector HA 8 pin M12 connector M12 female connector included, without female please add 162 as variant code														
DIRECTION TYPE	axial A radial R														
VARIANT	custom version XXX														

58 F

63 F - G

Dimensions with axial output



torque pin is included in model G, for mounting instruction please refer to product installation notes

dimensions in mm

ELECTRICAL SPECIFICATIONS

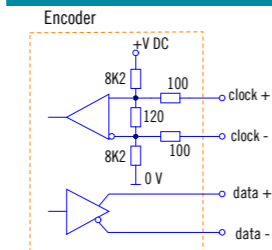
Multiturn resolution	from 2 to 16384 turns
Singleturn resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (iC-HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch)	active high (+V DC) connect to 0 V if not used
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	18 µs
SSI pause time (Tp)	> 35 µs
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 13ST) 13 to 14 bit multiturn = length 27 bit (14MT + 13ST)
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 8* / 9* / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	5 x 10 ⁻⁶ kgm ² (119 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	450 g (15,87 oz)

SSI SCHEMATICS



BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA	32 pin ME
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A	A
bit 2	B ¹ / G ¹	yellow	yellow	B	B
bit 3	B ² / G ²	blue	blue	C	C
bit 4	B ³ / G ³	brown	brown	D	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E	E
bit 6	B ⁵ / G ⁵	white	white	F	F
bit 7	B ⁶ / G ⁶	grey	grey	G	G
bit 8	B ⁷ / G ⁷	purple	purple	H	H
bit 9	B ⁸ / G ⁸	grey / pink	grey / pink	J	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N	N
bit 14	B ¹³ / G ¹³	/	white / grey	/	P
bit 15	B ¹⁴ / G ¹⁴	/	grey / brown	/	R
bit 16	B ¹⁵ / G ¹⁵	/	white / pink	/	S
bit 17	B ¹⁶ / G ¹⁶	/	pink / brown	/	T
bit 18	B ¹⁷ / G ¹⁷	/	white / blue	/	U
bit 19	B ¹⁸ / G ¹⁸	/	brown / blue	/	V
bit 20	B ¹⁹ / G ¹⁹	/	white / red	/	W
bit 21	B ²⁰ / G ²⁰	/	brown / red	/	X
bit 22	B ²¹ / G ²¹	/	white / black	/	Y
bit 23	B ²² / G ²²	/	brown / black	/	Z
bit 24	B ²³ / G ²³	/	grey / green	/	a
bit 25	B ²⁴ / G ²⁴	/	yellow / pink	/	b
bit 26	B ²⁵ / G ²⁵	/	yellow / blue	/	c
bit 27	B ²⁶ / G ²⁶	/	green / blue	/	d
LATCH	/	/	yellow / grey	R	e
0 V	/	black	black	T	j
U / D	/	red / blue	red / blue	U	g
+ V DC	/	red	red	V	h
≡	/	shield	shield	S	housing

BIT PARALLEL CONNECTOR OR CABLE CHOICE

According to the resolution and the chosen number of turns is possible to calculate the connections required by the connector or the cable. From the below table is possible to know the connection number.

EXAMPLE 1:

256 PPR = 8 connections
N° turns 32 = 5 connections
Total connections 13.

EXAMPLE 2:

4096 PPR = 12 connections
N° turns 4096 = 12 connections
Total connections 24.

From 1 to 13 connections a 16 cores cable (PD) or a 19 cores connector (MA) have to be considered.

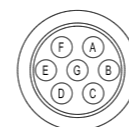
From 14 to 27 connections a 32 cores cable (PE) or a 32 cores connector (ME) have to be considered.

If LATCH is used a cable or a 32 poles connector is required.

SSI CONNECTIONS

Function	Cable PC	7 pin MC	12 pin HA	8 pin M12
+ V DC	red	G	8	8
0 V	black	F	1	5
data +	green	C	2	3
data -	brown	D	10	2
clock +	yellow	A	3	4
clock -	orange or pink	B	11	6
U / D	red / blue	E	5	7
≡	shield	housing	9	housing

MC connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



HA connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



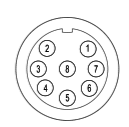
MA connector (19 pin)
Amphenol 62IN 12E 14-19 P
solder side view FV



ME connector (32 pin)
Glenair IPT 02 A 18-32 P F6
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



EAM 90 A - 115 A BIT PARALLEL - SSI SOLID SHAFT MULTITURN ABSOLUTE ENCODER

MAIN FEATURES

Optical absolute multiturn encoder for general factory automation.



- Optical sensor technology (OptoASIC + gears)
- Resolution up to 27 bit (13 bit single turn (8192 ppr) + 14 bit multiturn (16384 turns))
- Power supply up to +28 V DC with Bit Parallel or SSI as electrical interface
- Cable or connector output
- Solid shaft up to 11 mm diameter
- Mounting by synchronous or REO-444 flange



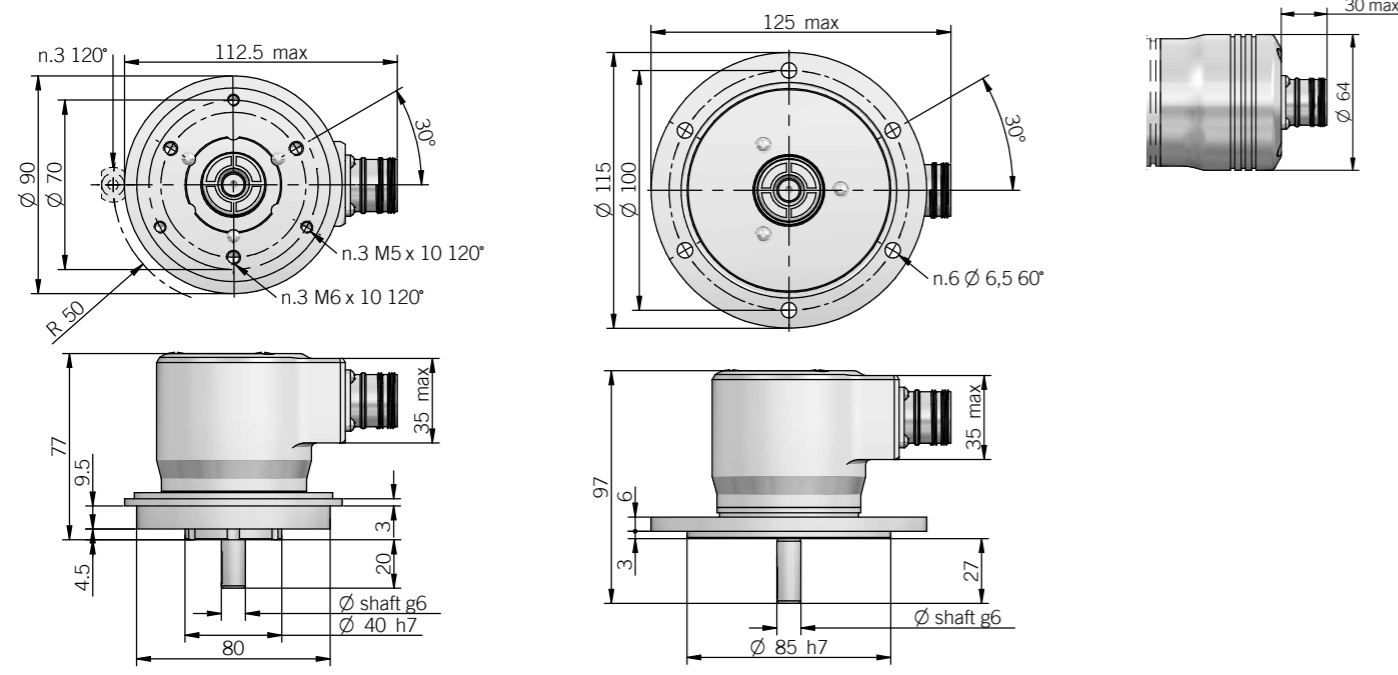
ORDERING CODE	EAM	90A	R	512 / 512	G	8/28	P	P	X	10	X	6	PD	R	.XXX
ORDERING CODE BIT PARALLEL	SERIES multiturn absolute encoder EAM	MODEL synchronous flange ø 40 mm 90A REO444 flange 115A													
		rev. 2.0 R													
		MULTITURN RESOLUTION (powers of 2) turns from 2 to 16384													
		SINGLETURN RESOLUTION (powers of 2) ppr from 2 to 8192													
		CODE TYPE binary B gray G													
		POWER SUPPLY 8 ... 28 V DC 8/28													
		ELECTRICAL INTERFACE push-pull P													
		LOGIC negative N positive P													
		OPTIONS latch L to be reported if not used X													
		SHAFT DIAMETER (mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11													
		ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S													
		MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6													
		OUTPUT TYPE (up to 13 bit as total resolution) 16 cores cable (standard length 1,5 m) PD (from 14 to 27 bit as total resolution or with latch option) 32 cores cable (standard length 1,5 m) PE (up to 13 bit as total resolution) 19 pin MIL connector MA (from 14 to 27 bit as total resolution) 32 pin MIL connector ME female connector included, without female please add 162 as variant code													
		DIRECTION TYPE axial A radial R													
		VARIANT custom version XXX													

ORDERING CODE	EAM	90A	R	4096 / 4096	G	8/28	S	X	X	10	X	6	MC	R	.XXX
ORDERING CODE SSI	SERIES multiturn absolute encoder EAM	MODEL synchronous flange ø 40 mm 90A REO444 flange 115A													
		rev. 2.0 R													
		MULTITURN RESOLUTION (powers of 2) turns from 2 to 16384													
		SINGLETURN RESOLUTION ppr 4096 / 8192													
		CODE TYPE binary B gray G													
		POWER SUPPLY 8 ... 28 V DC 8/28													
		ELECTRICAL INTERFACE Serial Synchronous Interface - SSI S													
		LOGIC to be reported X													
		OPTIONS to be reported X													
		SHAFT DIAMETER (mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11													
		ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S													
		MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6													
		OUTPUT TYPE cable (standard length 1,5 m) PC 7 pin MIL connector MC 12 pin M23 connector HA 8 pin M12 connector M12 female connector included, without female please add 162 as variant code													
		DIRECTION TYPE axial A radial R													
		VARIANT custom version XXX													

90 A

115 A

Dimensions with axial output



fixing clamps not included, please refer to Accessories section
dimensions in mm

ELECTRICAL SPECIFICATIONS

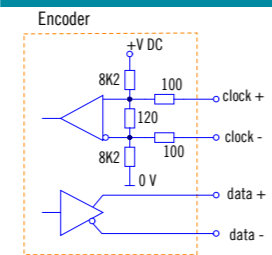
Multiturn resolution	from 2 to 16384 turns
Singleturn resolution	from 2 to 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	P = push-pull (iC-HD2) S = RS-422 (LTC1690 or equivalent)
Auxiliary inputs (U/D - Latch)	active high (+V DC) connect to 0 V if not used
Max frequency	output: 25 kHz LSB (Bit Parallel) clock input: 100 kHz ... 1 MHz (SSI)
SSI monostable time (Tm)	18 µs
SSI pause time (Tp)	> 35 µs
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 13ST) 13 to 14 bit multiturn = length 27 bit (14MT + 13ST)
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 9,52 (3/8") / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	650 g (22,93 oz)

SSI SCHEMATICS



BIT PARALLEL CONNECTIONS

Function	Binary / Gray	Cable PD	Cable PE	19 pin MA	32 pin ME
bit 1 (LSB)	B ⁰ / G ⁰	green	green	A	A
bit 2	B ¹ / G ¹	yellow	yellow	B	B
bit 3	B ² / G ²	blue	blue	C	C
bit 4	B ³ / G ³	brown	brown	D	D
bit 5	B ⁴ / G ⁴	orange or pink	orange or pink	E	E
bit 6	B ⁵ / G ⁵	white	white	F	F
bit 7	B ⁶ / G ⁶	grey	grey	G	G
bit 8	B ⁷ / G ⁷	purple	purple	H	H
bit 9	B ⁸ / G ⁸	grey / pink	grey / pink	J	J
bit 10	B ⁹ / G ⁹	white / green	white / green	K	K
bit 11	B ¹⁰ / G ¹⁰	brown / green	brown / green	L	L
bit 12	B ¹¹ / G ¹¹	white / yellow	white / yellow	M	M
bit 13	B ¹² / G ¹²	yellow / brown	yellow / brown	N	N
bit 14	B ¹³ / G ¹³	/	white / grey	/	P
bit 15	B ¹⁴ / G ¹⁴	/	grey / brown	/	R
bit 16	B ¹⁵ / G ¹⁵	/	white / pink	/	S
bit 17	B ¹⁶ / G ¹⁶	/	pink / brown	/	T
bit 18	B ¹⁷ / G ¹⁷	/	white / blue	/	U
bit 19	B ¹⁸ / G ¹⁸	/	brown / blue	/	V
bit 20	B ¹⁹ / G ¹⁹	/	white / red	/	W
bit 21	B ²⁰ / G ²⁰	/	brown / red	/	X
bit 22	B ²¹ / G ²¹	/	white / black	/	Y
bit 23	B ²² / G ²²	/	brown / black	/	Z
bit 24	B ²³ / G ²³	/	grey / green	/	a
bit 25	B ²⁴ / G ²⁴	/	yellow / pink	/	b
bit 26	B ²⁵ / G ²⁵	/	yellow / blue	/	c
bit 27	B ²⁶ / G ²⁶	/	green / blue	/	d
LATCH	/	/	yellow / grey	R	e
0 V	/	black	black	T	j
U / D	/	red / blue	red / blue	U	g
+ V DC	/	red	red	V	h
≡	/	shield	shield	S	housing

BIT PARALLEL CONNECTOR OR CABLE CHOICE

According to the resolution and the chosen number of turns is possible to calculate the connections required by the connector or the cable. From the below table is possible to know the connection number.

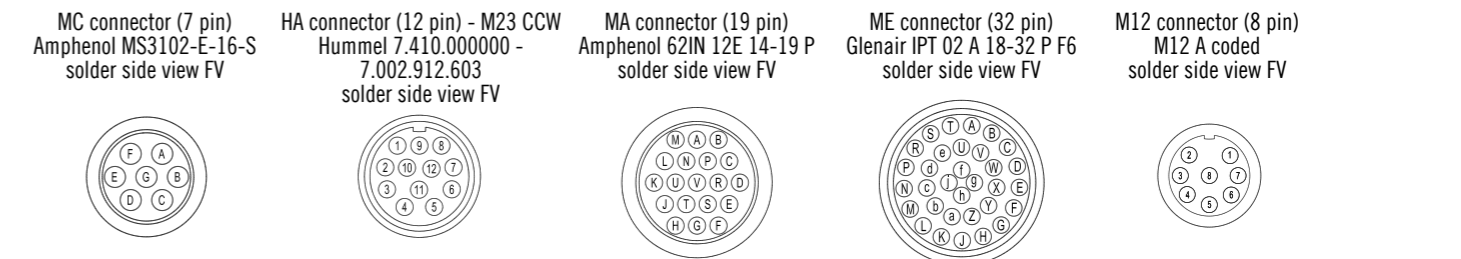
EXAMPLE 1:
256 PPR = 8 connections
N° turns 32 = 5 connections
Total connections 13.

EXAMPLE 2:
4096 PPR = 12 connections
N° turns 4096 = 12 connections
Total connections 24.

From 1 to 13 connections a 16 cores cable (PD) or a 19 cores connector (MA) have to be considered.
From 14 to 27 connections a 32 cores cable (PE) or a 32 cores connector (ME) have to be considered.
If LATCH is used a cable or a 32 poles connector is required.

SSI CONNECTIONS

Function	Cable PC	7 pin MC	12 pin HA	8 pin M12
+ V DC	red	G	8	8
0 V	black	F	1	5
data +	green	C	2	3
data -	brown	D	10	2
clock +	yellow	A	3	4
clock -	orange or pink	B	11	6
U / D	red / blue	E	5	7
≡	shield	housing	9	housing



EAM 58 B / C - 63 A / D / E PROFIBUS

SOLID SHAFT MULTITURN ABSOLUTE ENCODER



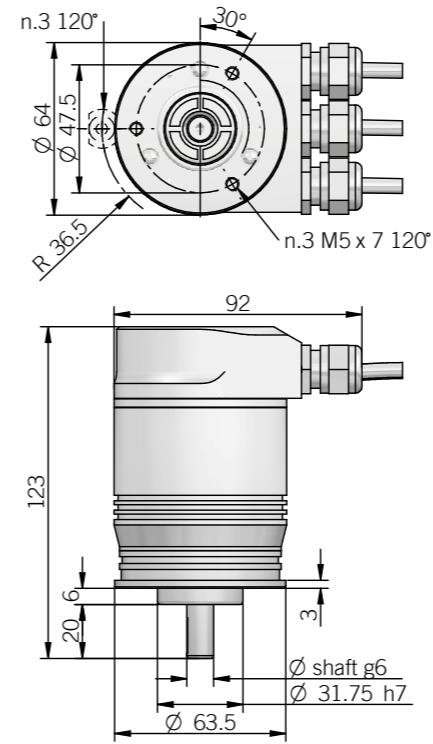
MAIN FEATURES

Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- 25 bit total resolution (13 bit single turn (8192 ppr) + 12 bit multiturn (4096 turns))
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Intelligent status leds
- Terminal box or M12 connector for fast setup
- Solid shaft diameter up to 10 mm
- Mounting by synchronous, clamping or centering 2,5" square flange

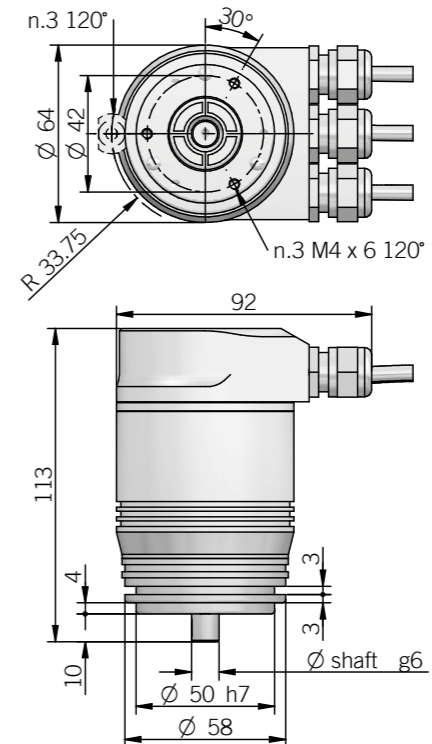


63 A



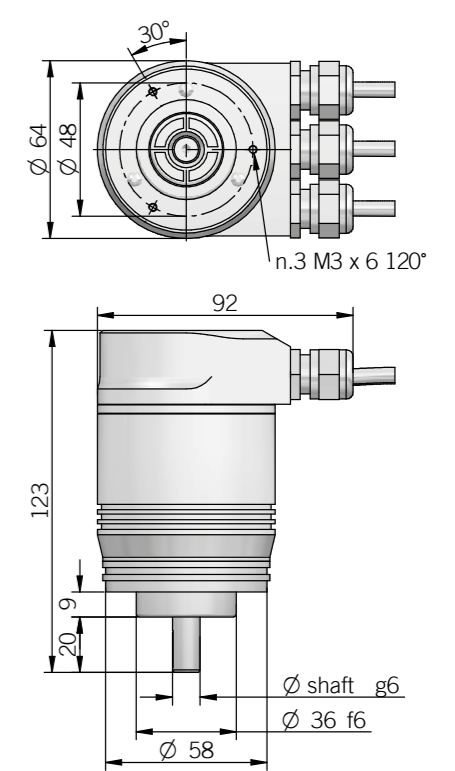
fixing clamps not included, please refer to Accessories section

58 B

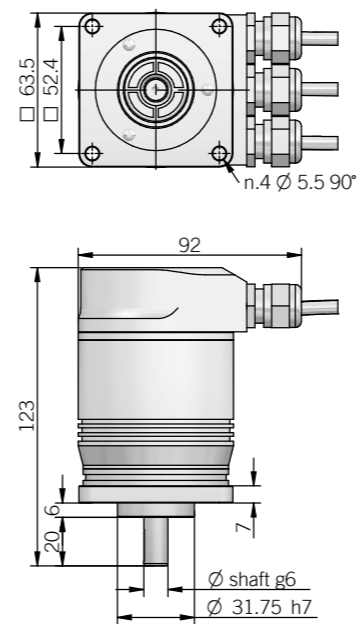


fixing clamps not included, please refer to Accessories section

58 C

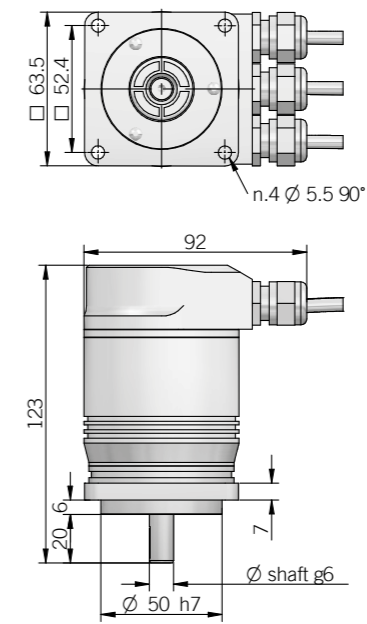


63 D



dimensions in mm

63 E



EAM 63A R 4096 / 4096 B 12/28 FXX 10 X 6 P3R .XXX											
SERIES multiturn absolute encoder EAM											
MODEL synchronous flange Ø 31.75 mm 63A synchronous flange Ø 50 mm 58B clamping flange Ø 36 mm 58C centering square flange Ø 31.75 mm 63D centering square flange Ø 50 mm 63E											
rev. 2.0 R											
MULTITURN RESOLUTION turns 4096											
SINGLETURN RESOLUTION ppr 4096 / 8192											
CODE TYPE binary B											
POWER SUPPLY 12 ... 28 V DC 12/28											
ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FXX											
SHAFT DIAMETER (mod. 58 B) mm 6 (mod. 63 A / D) (3/8") 9,52 mm 9 (mod. 58 C - 63 A / D / E) mm 10											
ENCLOSURE RATING IP 54 X IP 66 S											
MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6											
OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R female connector included, without female please add 162 as variant code											
VARIANT custom version XXX											

ELECTRICAL SPECIFICATIONS

Multiturn resolution	1 ... 4096 turns programmable during commissioning
Singleturn resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

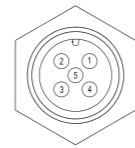
MECHANICAL SPECIFICATIONS

Shaft diameter	ø 6 / 9,52 (3/8") / 10 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	10 N axial / 20 N radial with ø6 shaft 100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painting aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	650 g (22,93 oz)

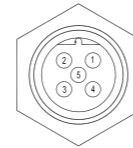
CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

S3 connector (M12 5 pins A coded) power supply view solder side FV



S3 connector (M12 5 pins B coded) line out - female view solder side FV



S3 connector (M12 5 pins B coded) line in - male view solder side MV



MAIN FEATURES

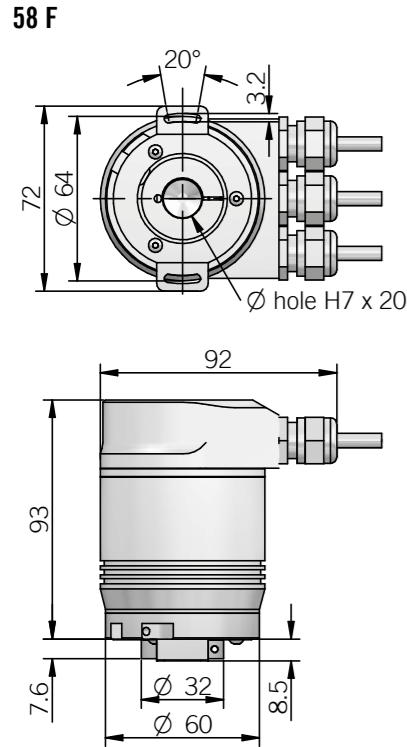
Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- 25 bit total resolution (13 bit single turn (8192 ppr) + 12 bit multiturn (4096 turns))
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Intelligent status leds
- Terminal box or M12 connector for fast setup
- Blind hollow shaft up to 15 mm diameter
- Mounting by stator coupling, spring or torque pin

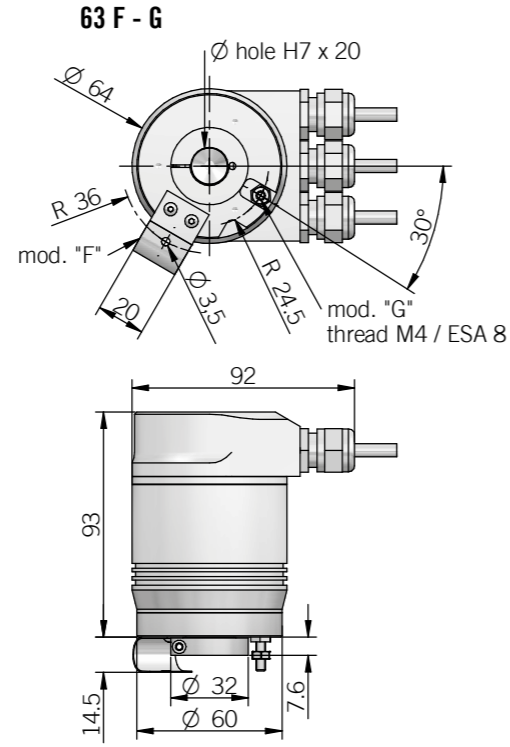


ORDERING CODE EAM 63F R 4096 / 4096 B 12/28 FXX 8 X 3 P3R . XXX

SERIES multiturn absolute encoder EAM	MODEL blind hollow shaft with stator coupling 58F blind hollow shaft with spring 63F blind hollow shaft with torque pin 63G	rev. 2.0 R	MULTITURN RESOLUTION turns 4096	SINGLETURN RESOLUTION ppr 4096 / 8192	CODE TYPE binary B	POWER SUPPLY 12 ... 28 V DC 12/28	ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FXX	BORE DIAMETER mm 8 (3/8") 9,52 mm 9 mm 10 mm 12 mm 14 mm 15	ENCLOSURE RATING IP 54 X	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R	VARIANT custom version XXX
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dimensions in mm



torque pin is included in model G, for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

Multiturn resolution	1 ... 4096 turns programmable during commissioning
Singleturn resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

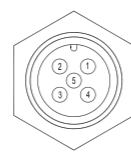
MECHANICAL SPECIFICATIONS

Bore diameter	∅ 8* / 9* / 10* / 12* / 14 / 15 mm * with supplied adapter shaft
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	5 x 10 ⁻⁶ kgm ² (119 x 10 ⁻⁶ lbft ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	650 g (22,93 oz)

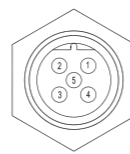
CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

S3 connector (M12 5 pins A coded) power supply view solder side FV



S3 connector (M12 5 pins B coded) line out - female view solder side FV



S3 connector (M12 5 pins B coded) line in - male view solder side MV



MAIN FEATURES

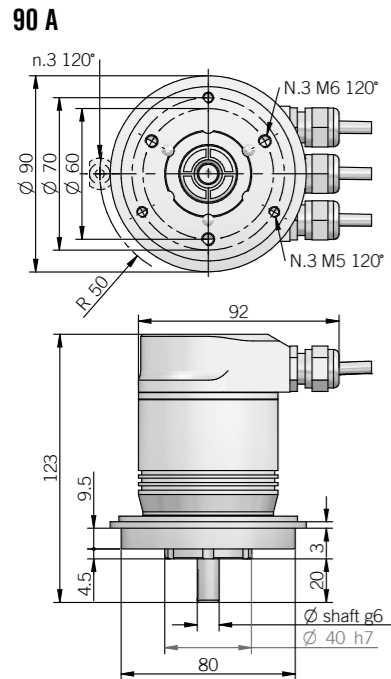
Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- 25 bit total resolution (13 bit single turn (8192 ppr) + 12 bit multiturn (4096 turns))
- Power supply up to +28 V DC with Profibus DP as electrical interface
- Intelligent status leds
- Terminal box or M12 connector for fast setup
- Solid shaft diameter up to 11 mm
- Mounting by synchronous or REO-444 flange

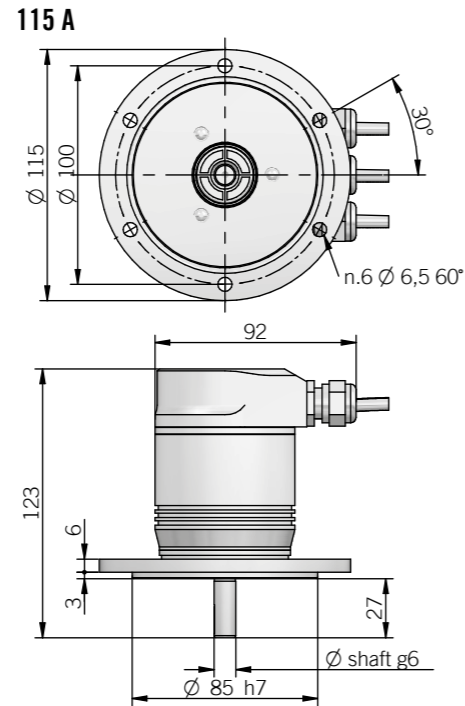


ORDERING CODE

EAM	90A	R	4096 / 4096	B	12/28	FXX	8	X	6	P3R	.XXX
SERIES multiturn absolute encoder EAM		MODEL synchronous flange ∅ 40 mm 90A REO444 flange 115A		rev. 2.0 R		MULTITURN RESOLUTION turns 4096		SINGLETURN RESOLUTION ppr 4096 / 8192		CODE TYPE binary B	
				POWER SUPPLY 12 ... 28 V DC 12/28		ELECTRICAL INTERFACE PROFIBUS DP V0 CLASS 2 FXX		SHAFT DIAMETER (mod. 90) (3/8") 9,52 mm 9 mm 10 (mod. 115) mm 11		ENCLOSURE RATING IP 54 X (mod. 90) IP 66 S	
				MAX ROTATION SPEED (IP 66) 3000 rpm 3 (IP 54) 6000 rpm 6		OUTPUT TYPE terminal box - radial cable glands P3R radial M12 connector M12R		female connector included, without female please add 162 as variant code		VARIANT custom version XXX	



fixing clamps not included, please refer to Accessories section
dimensions in mm



ELECTRICAL SPECIFICATIONS

Multiturn resolution	1 ... 4096 turns programmable during commissioning
Singleturn resolution	2 ... 4096 / 2 ... 8192 ppr programmable during commissioning
Power supply	11,4 ... 29,4 V DC
Current consumption without load	300 mA
Output type	RS 485 galvanically isolated
Max bus frequency	12 Mbaud
Diagnostic features	frequency warning position warning / alarm please refer to installation manual for more informations
Max frequency	max 25 kHz LSB
Accuracy	± 1/2 LSB
Counting direction	programmable during commissioning
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

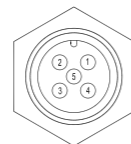
MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 9,52 / 10 / 11 mm
Enclosure rating	X = IP 54 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	IP 54 - 6000 rpm IP 66 - 3000 rpm
Max shaft load	100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,02 Nm (2,83 Ozin) IP 54 < 0,06 Nm (8,50 Ozin) IP 66
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +60°C (+32° ... +140°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	750 g (26,46 oz)

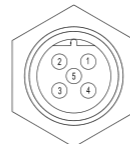
CONNECTIONS

Function	Pin M12A male	Pin M12B female	Pin M12B male
+ V DC	2		
0 V	4		
signal A (out)		2	
signal B (out)		4	
signal A (in)			2
signal B (in)			4

S3 connector (M12 5 pins A coded) power supply view solder side FV



S3 connector (M12 5 pins B coded) line out - female view solder side FV



S3 connector (M12 5 pins B coded) line in - male view solder side MV



MAIN FEATURES

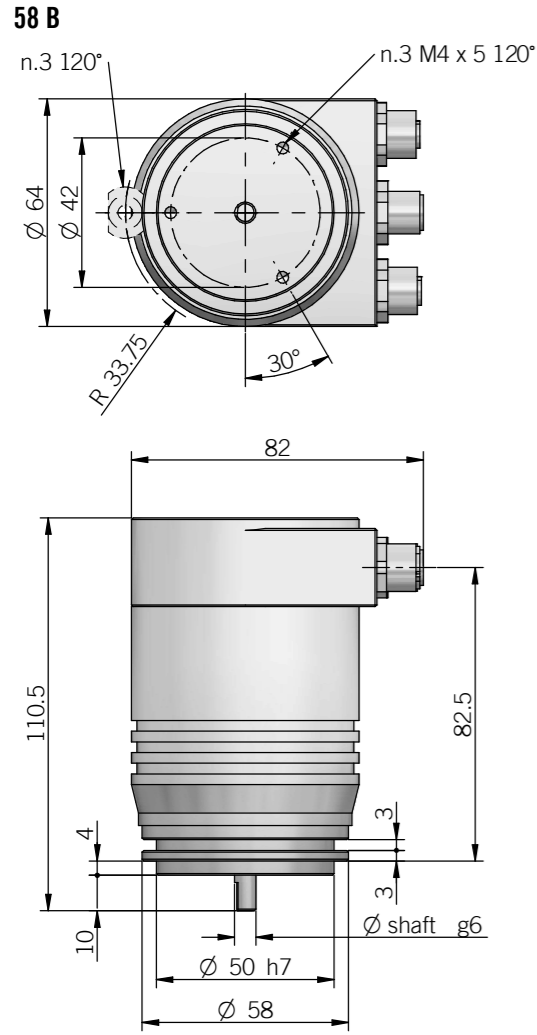
Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- 25 bit total resolution (13 bit single turn + 12 bit multiturn)
- Power supply up to +30 V DC with Profinet IO as electrical interface
- Intelligent status leds
- M12 connector for fast setup
- Solid shaft diameter up to 10 mm
- Mounting by synchronous or clamping flange
- Operating temperature -40° ... +80°C (-40° ... +176°F)



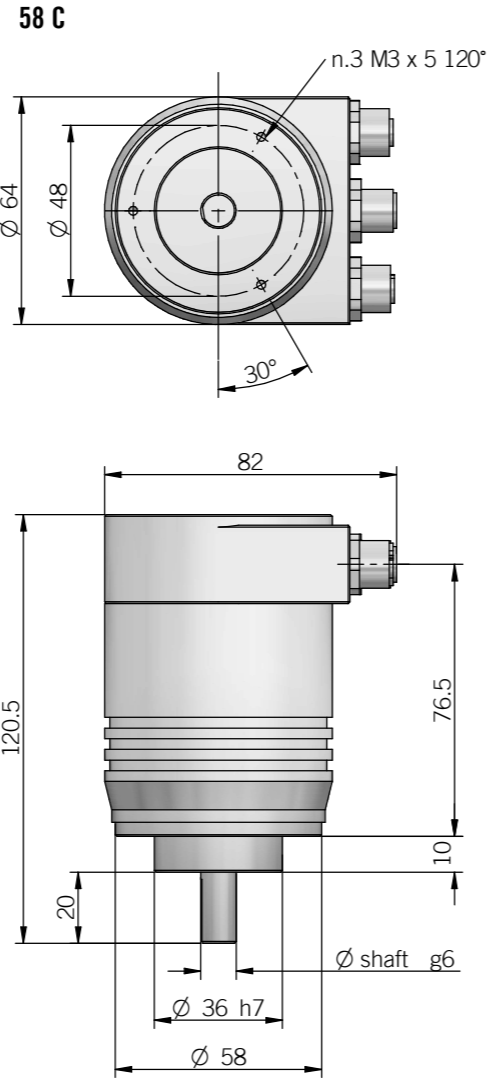
ORDERING CODE

AAM	58B	12 / 13	B	10/30	PFN	6	X	X	M12R	.162		
SERIES absolute multiturn encoder AAM		MODEL synchronous flange ∅ 50 mm 58B clamping flange ∅ 36 mm 58C	MULTITURN RESOLUTION bit 12	SINGLETURN RESOLUTION bit 13	CODE TYPE binary B	POWER SUPPLY 10 ... 30 V DC 10/30	ELECTRICAL INTERFACE PROFINET IO PFN	SHAFT DIAMETER (mod. 58B) mm 6 (mod. 58C) mm 10	ENCLOSURE RATING IP 65 X	OPTIONS to be reported X	OUTPUT TYPE radial M12 connector M12R	VARIANT without mating connector 162



fixing clamps not included, please refer to Accessories

dimensions in mm



ELECTRICAL SPECIFICATIONS

Multiturn resolution	1 ... 12 bit programmabile during commissioning
Singleturn resolution	1 ... 13 bit programmabile during commissioning
Power supply	10 ... 30 V DC (with reverse polarity protection)
Current consumption without load	< 200 mA
Electrical interface	PROFINET IO RT Class 1 / Conformance Class B
Encoder profile	V 4.1 - Application Class 3
Hardware features	Ertec 200 auto-negotiation auto-polarity auto-crossover diagnostic LEDs
Code type	binary
Max bus frequency	100 Mbit/s
Cycle time	≤ 1 ms
Accuracy	± 0,04°
Start-up time	500 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive

MECHANICAL SPECIFICATIONS

Solid shaft diameter	∅ 6 mm (mod. 58B) ∅ 10 mm (mod. 58C)
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	6000 rpm
Max shaft load	80 N radial / 40 N axial
Starting torque (at +20°C / 68°F)	< 0,05 Nm
Moment of inertia	approx 1,8 x 10 ⁻⁶ kgm ²
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibrations	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Bearings life	10 ⁹ revolutions
Bearings	n° 2 ball bearings
Shaft material	1.4305 / AISI 303 stainless steel
Body / cover material	EN-AW 2011 aluminium
Housing material	painting aluminium
Operating temperature	-40° ... +80°C (-40° ... +176°F)
Storage temperature	-40° ... +85°C (-40° ... +185°F)
Weight	600 g (21 oz)

CONNECTIONS

	Pin	Function
PORT 1 Connector	1	Tx D+
	2	Rx D+
	3	Tx D-
	4	Rx D-
POWER connector	1	+V DC
	2	/
	3	0 V
	4	/
PORT 2 Connector	1	Tx D+
	2	Rx D+
	3	Tx D-
	4	Rx D-

female connectors not included, please refer to Accessories section



PORT 1 / 2 connector M12 D-coded (4-pin) (front view)



POWER connector M12 A-coded (front view)



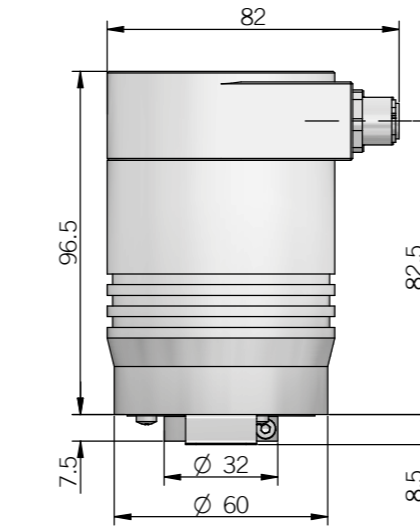
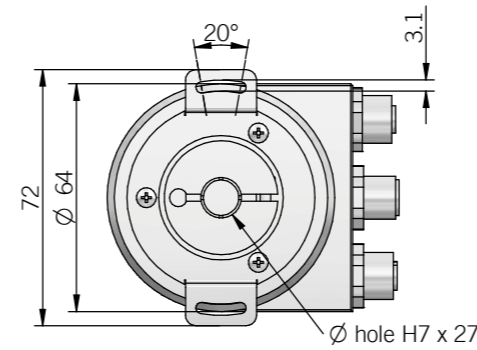
MAIN FEATURES

Industry standard multiturn absolute encoder for factory automation applications.

- Optical sensor technology (OptoASIC + gears)
- 25 bit total resolution (13 bit single turn + 12 bit multiturn)
- Power supply up to +30 V DC with Profinet IO as electrical interface
- Intelligent status leds
- M12 connector for fast setup
- Blind hollow shaft diameter up to 15 mm
- Mounting by stator coupling
- Operating temperature -40° ... +80°C (-40° ... +176°F)



58 F



dimensions in mm

MECHANICAL SPECIFICATIONS

Bore diameter	Ø 15 / 12* / 10* mm * with optional adapter shaft, please refer to Accessories section
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	6000 rpm
Max shaft load	80 N radial / 40 N axial
Starting torque (at +20°C / 68°F)	< 0,05 Nm
Moment of inertia	approx 1,8 x 10 ⁻⁶ kgm ²
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibrations	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Bearings life	10 ⁹ revolutions
Bearings	n° 2 ball bearings
Shaft material	1.4305 / AISI 303 stainless steel
Body / cover material	EN-AW 2011 aluminium
Housing material	painted aluminium
Flange material	EN-AW 2011 aluminium
Operating temperature	-40° ... +80°C (-40° ... +176°F)
Storage temperature	-40° ... +85°C (-40° ... +185°F)
Fixing torque for collar clamping	1,5 Nm (212 Ozin) recommended
Weight	600 g (21 oz)

ELECTRICAL SPECIFICATIONS

Multiturn resolution	1 ... 12 bit programmable during commissioning
Singleturn resolution	1 ... 13 bit programmable during commissioning
Power supply	10 ... 30 V DC (with reverse polarity protection)
Current consumption without load	< 200 mA
Electrical interface	PROFINET IO RT Class 1 / Conformance Class B
Encoder profile	V 4.1 - Application Class 3
Hardware features	Ertec 200 auto-negotiation auto-polarity auto-crossover diagnostic LEDs
Code type	binary
Max bus frequency	100 Mbit/s
Cycle time	≤ 1 ms
Start-up time	500 ms
Accuracy	± 0,04°
Electromagnetic compatibility	according to 2014/30/EU directive
RoHs	according to 2011/65/EU directive

CONNECTIONS

	Pin	Function
PORT 1 Connector	1	Tx D+
	2	Rx D+
	3	Tx D-
	4	Rx D-
POWER connector	1	+V DC
	2	/
	3	0 V
	4	/
PORT 2 Connector	1	Tx D+
	2	Rx D+
	3	Tx D-
	4	Rx D-

female connectors not included, please refer to Accessories section



PORT 1 / 2 connector
M12 D-coded (4-pin)
(front view)



POWER connector
M12 A-coded
(front view)



ORDERING CODE

SERIES absolute multiturn encoder AAM	MODEL blind hollow shaft with stator coupling 58F	MULTITURN RESOLUTION bit 12	SINGLETURN RESOLUTION bit 13	CODE TYPE binary B	POWER SUPPLY 10 ... 30 V DC 10/30	ELECTRICAL INTERFACE PROFINET IO PFN	BORE DIAMETER mm 15	ENCLOSURE RATING IP 65 X	OPTIONS to be reported X	OUTPUT TYPE radial M12 connector M12R	VARIANT without mating connector 162
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MAIN FEATURES

Explosion proof encoder for applications within explosive and hazardous areas.

- Optical sensor technology (OptoASIC + gears)
- Resolution up to 27 bit (13 bit single turn (8192 ppr) + 14 bit multiturn (16384 turns))
- Power supply up to +28 V DC with SSI as electrical interface
- Cable output
- Solid shaft diameter up to 10 mm
- Mounting with synchronous or centering square flange

EX CLASSIFICATION

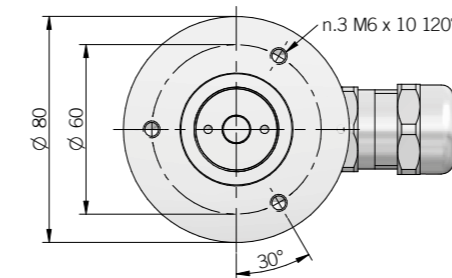
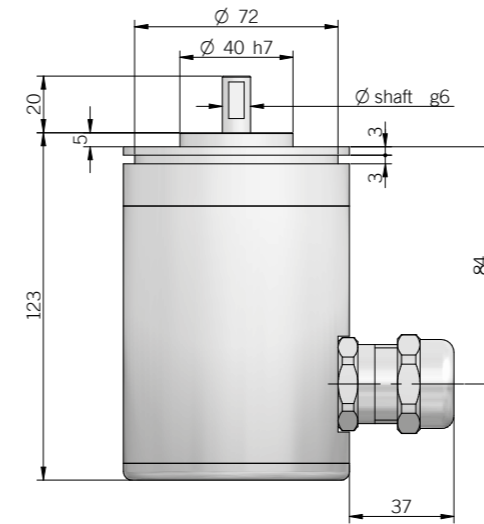
It has been assured with EC-TYPE Examination Certificate CESI 04 ATEX 082 that the EAMX 80 comply with essential health and safety requirements according to

- EN 60079-0:2012+A11:2013
- EN 60079-1:2007
- EN 60079-31:2014

Declaration of conformity and CE declaration are available for download from Eltra website www.eltra.it

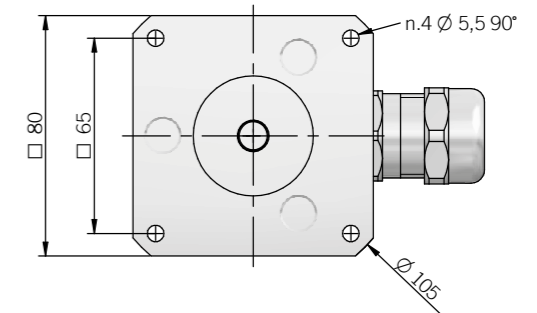
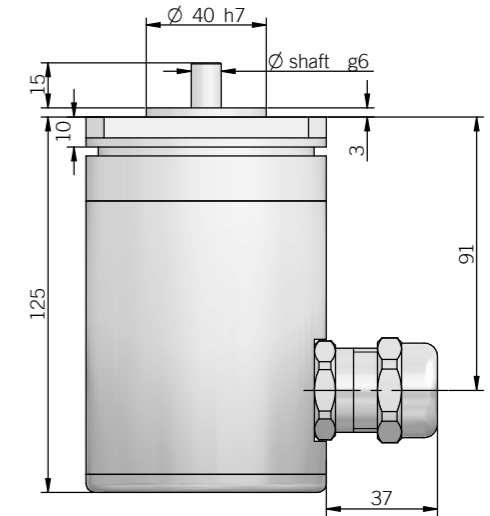


80 A



fixing clamps not included, please refer to Accessories section
dimensions in mm

80 D



ORDERING CODE EAMX 80A 4096 / 4096 G 8/28 S X X 10 X 3 PR .XXX

PROPERTY	VALUE
SERIES	EAMX
MODEL	80A
MULTITURN RESOLUTION	4096
SINGLETURN RESOLUTION	4096
CODE TYPE	G
POWER SUPPLY	8/28
ELECTRICAL INTERFACE	S
LOGIC	X
OPTION	X
SHAFT DIAMETER	10
ENCLOSURE RATING	IP 65
MAX ROTATION SPEED	3000 rpm
OUTPUT TYPE	PR
VARIANT	.XXX

ELECTRICAL SPECIFICATIONS

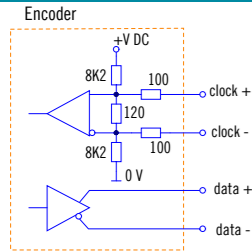
Multiturn resolution	from 2 to 16384 turns
Singleturn resolution	4096 / 8192 ppr
Power supply	7,6 ... 29,4 V DC
Current consumption without load	100 mA
Max load current	20 mA / channel
Output type*	RS-422 (LTC1690 or equivalent)
Auxiliary input (U/D)	active high (+V DC) connect to 0 V if not used
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	18 μs
SSI pause time (Tp)	> 35 μs
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 13ST) 13 to 14 bit multiturn = length 27 bit (14MT + 13ST)
Accuracy	± 1/2 LSB
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 10 mm
Enclosure rating	IP 65 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	1,5 x 10 ⁻⁶ kgm ² (36 x 10 ⁻⁶ lbf ²)
Starting torque (at 20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Bearing stage material	anodized aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	anodized aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	0° ... +50°C (+32° ... +122°F)
Storage temperature	-15° ... +70°C (+5° ... +158°F)
Weight	1200 g (42,33 oz)

SSI SCHEMATICS



CONNECTIONS

Function	Cable
+ V DC	red
0 V	grey
data +	green
data -	brown
clock +	yellow
clock -	pink
U / D	blue
⊥	shield

ATEX MARKING

II 2GD
Ex d IIC T6 Gb
Ex tb IIIC T85°C Db
IP 65

II 2GD

II: group II: different than mines
 2: category 2: high level of protection
 GD: areas containing gas (G) and dust (D)
Ex d IIC T6 Gb
 Ex d: flameproof enclosure for explosive atmospheres with gases, vapours and mists
 IIC: group of gas IIC
 T6: max surface temperature +85°C of the device for atmospheres with gas
 Gb: product with a high level of protection
Ex tb IIIC T85°C Db
 Ex tb: flameproof enclosure safety type
 IIIC: group of dust combustibles IIIC
 T85°C: max surface temperature +85°C of the device in the presence of dust
 Db: product with a high level of protection

MAIN FEATURES

Miniaturized multiturn absolute encoder for limited size applications.

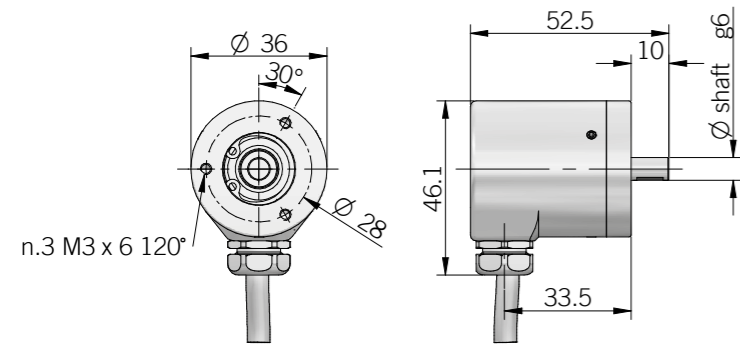
- Magnetic sensor technology without contact (Magnetic ASIC + Energy Harvesting)
- Sturdy construction thanks to separated chambers
- Up to 51 bit as total resolution (12 bit single turn + 39 bit multiturn)
- Power supply up to +30 V DC with SSI as electrical interface
- Code reset for easy setup
- Cable output, connector available on cable end
- 6 mm diameter solid shaft
- Mounting by fixing flange



ORDERING CODE

EAM	36A	13 / 12	B	5	S	P	X	6	X	8	PR	.XXX
SERIES		magnetic multiturn absolute encoder series EAM										
MODEL		fixing flange ø 28 mm 36A										
MULTITURN RESOLUTION		turns from 1 to 39 bit										
SINGLETURN RESOLUTION		from 1 to 12 bit										
CODE TYPE		binary B gray G										
POWER SUPPLY		5 V DC 5 8 ... 30 V DC 8/30										
ELECTRICAL INTERFACE		Serial Synchronous Interface - SSI S										
LOGIC		positive P										
OPTIONS		to be reported if not used X reset ZE										
SHAFT DIAMETER		mm 6										
ENCLOSURE RATING		IP 67 cover side / IP 65 shaft side X										
MAX ROTATION SPEED		8000 rpm 8										
OUTPUT TYPE		radial cable (standard length 0,5 m) PR										
VARIANT		custom version XXX										

36 A



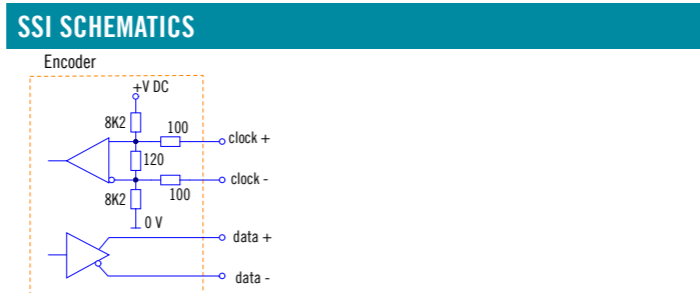
dimensions in mm

ELECTRICAL SPECIFICATIONS	
Multiturn resolution	turns from 1 to 39 bit
Singleturn resolution	ppr from 1 to 12 bit
Power supply	5 = 4,75 ... 5,25 V DC 8/30 = 7,6 ... 30 V DC (reverse polarity protection)
Power draw without load	< 400 mW
Output type*	RS-422 (SN65LBC179Q or equivalent)
Code type	binary or gray
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset t_{min} 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 μ s
SSI pause time (Tp)	> 35 μ s
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 12ST + '0') 13 to 14 bit multiturn = length 27 bit (14MT + 12ST + '0') 15 to 19 bit multiturn = length 32 bit (19MT + 12ST + '0')
Accuracy	$\pm 0,35^\circ$ typical
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

CONNECTIONS	
Function	Cable
+ V DC	red
0 V	black
data +	green
data -	brown
clock +	yellow
clock -	orange
U / D	red / blue
RESET	white
---	shield

MECHANICAL SPECIFICATIONS	
Shaft diameter	\varnothing 6 mm
Enclosure rating	IP 67 cover side / IP 65 shaft side (IEC 60529)
Rotation speed	8000 rpm continuous / 10000 rpm max
Max shaft load	20 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,001 x 10 ⁻⁶ kgm ² (0,02 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	AISI 420 stainless steel
Bearing stage material	EN-AW 2011 aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Weight	150 g (5,29 oz)



MAIN FEATURES

Miniaturized multiturn absolute encoder for limited size applications.

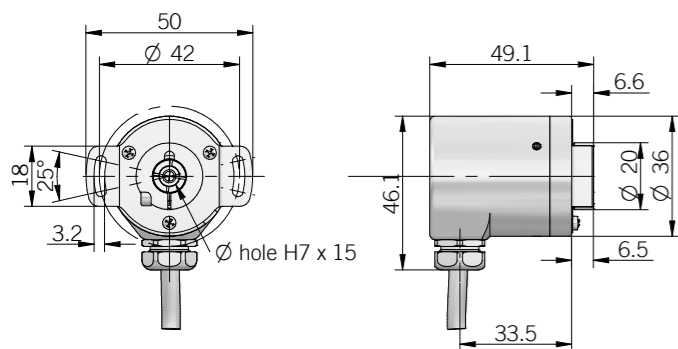


- Magnetic sensor technology without contact (Magnetic ASIC + Energy Harvesting)
- Sturdy construction thanks to separated chambers
- Up to 51 bit as total resolution (12 bit single turn + 39 bit multiturn)
- Power supply up to +30 V DC with SSI as electrical interface
- Code reset for easy setup
- Cable output, connector available on cable end
- 6 mm diameter blind hollow shaft
- Mounting by stator coupling or torque pin



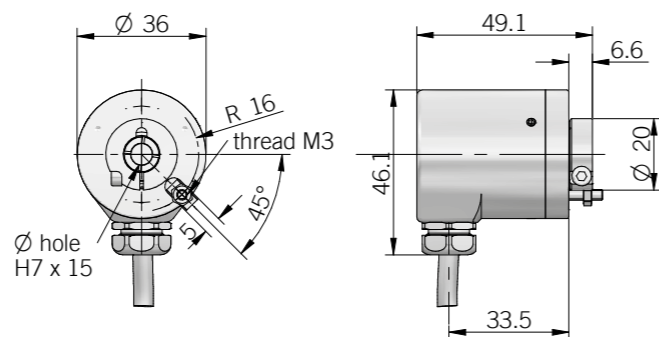
ORDERING CODE	EAM	36F	13	/	12	G	8/30	S	P	X	6	X	8	P	.XXX
	SERIES														
	magnetic multiturn absolute encoder series EAM														
	MODEL														
	blind hollow shaft with stator coupling 36F														
	blind hollow shaft with torque pin 36G														
	MULTITURN RESOLUTION														
	turns from 1 to 39 bit														
	SINGLETURN RESOLUTION														
	from 1 to 12 bit														
	CODE TYPE														
	binary B														
	gray G														
	POWER SUPPLY														
	5 V DC 5														
	8 ... 30 V DC 8/30														
	ELECTRICAL INTERFACE														
	Serial Synchronous Interface - SSI S														
	LOGIC														
	positive P														
	OPTIONS														
	to be reported if not used X														
	reset ZE														
	BORE DIAMETER														
	mm 6														
	ENCLOSURE RATING														
	IP 67 cover side / IP 65 shaft side X														
	MAX ROTATION SPEED														
	8000 rpm 8														
	OUTPUT TYPE														
	radial cable (standard length 0,5 m) PR														
	VARIANT														
	custom version XXX														

36 F



dimensions in mm

36 G



torque pin is included in model G, for mounting instruction please refer to product installation notes

ELECTRICAL SPECIFICATIONS

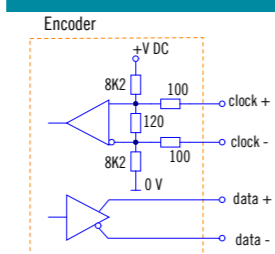
Multiturn resolution	turns from 1 to 39 bit
Singleturn resolution	ppr from 1 to 12 bit
Power supply	5 = 4,75 ... 5,25 V DC 8/30 = 7,6 ... 30 V DC (reverse polarity protection)
Power draw without load	< 400 mW
Output type*	RS-422 (SN65LBC179Q or equivalent)
Code type	binary or gray
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset t_{min} 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (T_m)	20 μs
SSI pause time (T_p)	> 35 μs
SSI frame	Tree format (MSB ... LSB) up to 12 bit multiturn = length 25 bit (12MT + 12ST + '0') 13 to 14 bit multiturn = length 27 bit (14MT + 12ST + '0') 15 to 19 bit multiturn = length 32 bit (19MT + 12ST + '0')
Accuracy	± 0,35° typical
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Bore diameter	ø 6 mm
Enclosure rating	IP 67 cover side / IP 65 shaft side (IEC 60529)
Rotation speed	8000 rpm continuous / 10000 rpm max
Max shaft load	20 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	0,001 x 10 ⁻⁶ kgm ² (0,02 x 10 ⁻⁶ lbf ²)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	AISI 420 stainless steel
Bearing stage material	EN-AW 2011 aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Fixing torque for collar clamping	0,6 Nm (85 Ozin) recommended
Weight	150 g (5,29 oz)

SSI SCHEMATICS



CONNECTIONS

Function	Cable
+ V DC	red
0 V	black
data +	green
data -	brown
clock +	yellow
clock -	orange
U / D	red / blue
RESET	white
⏏	shield

MAIN FEATURES

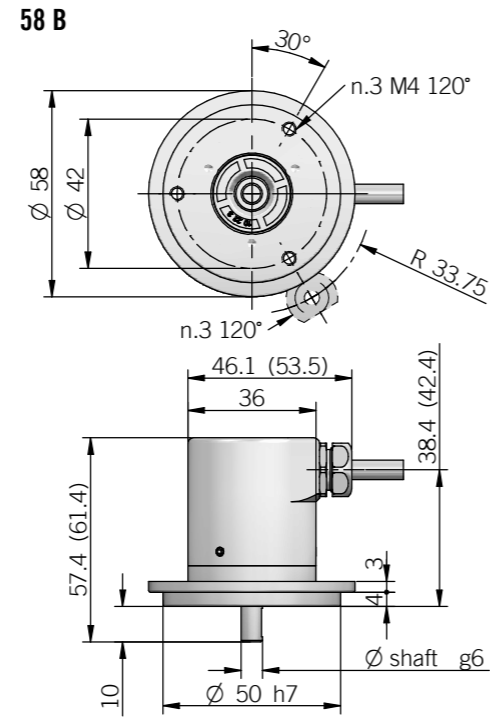
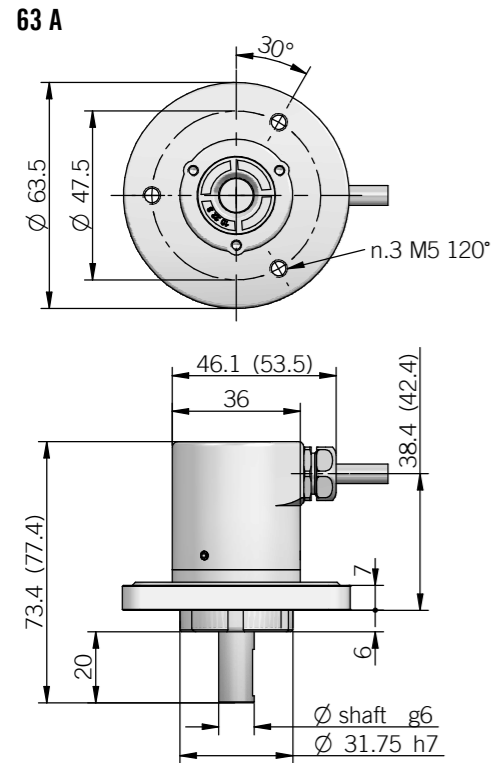
Industry standard multiturn absolute encoder for factory automation applications.

- Magnetic sensor technology without contact (Magnetic ASIC + Energy Harvesting)
- Up to 24 bit as total resolution (12 bit single turn + 12 bit multiturn)
- Power supply up to +30 V DC with SSI as electrical interface
- Code reset for easy setup
- Cable or connector output
- Solid shaft diameter up to 10 mm
- Mounting by synchronous, clamping or centering 2,5" square flange

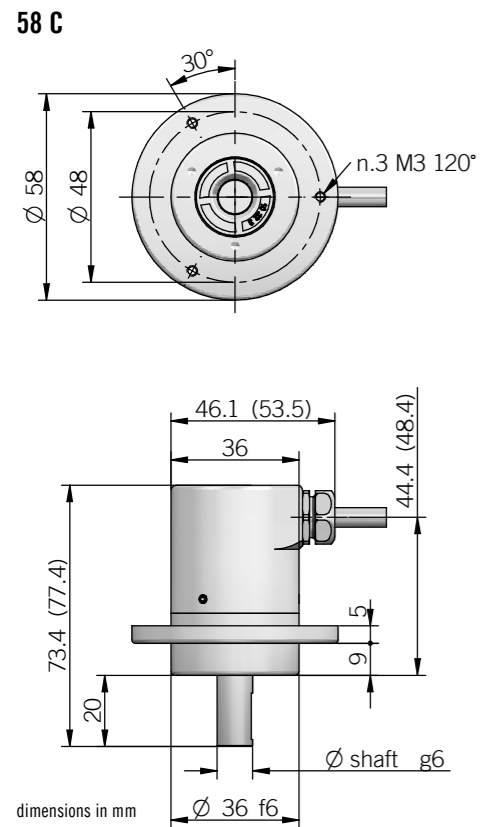


ORDERING CODE EAMW 58B 12 / 12 G 8/30 S P ZE 6 X X P R .XXX

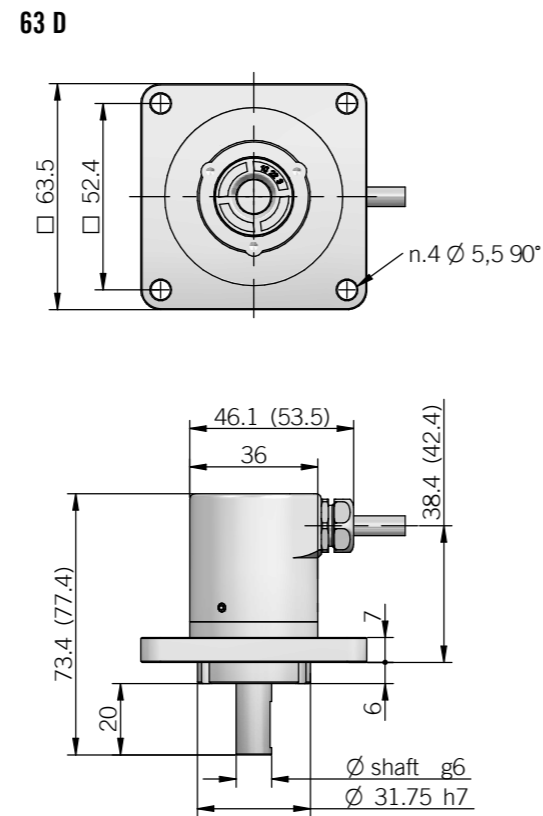
ORDERING CODE	EAMW	58B	12 / 12	G	8/30	S	P	ZE	6	X	X	P	R	.XXX
Series	magnetic multiturn absolute encoder series EAMW													
MODEL	synchronous flange ø 31.75 mm 63A synchronous flange ø 50 mm 58B clamping flange ø 36 mm 58C centering square flange ø 31.75 mm 63D													
MULTITURN RESOLUTION	12 bit													
SINGLETURN RESOLUTION	8 / 10 / 12 bit													
CODE TYPE	binary B gray G													
POWER SUPPLY	8 ... 30 V DC 8/30													
ELECTRICAL INTERFACE	Serial Synchronous Interface - SSI S													
LOGIC	positive P													
OPTIONS	reset ZE													
SHAFT DIAMETER	(mod. 58 B) mm 6 (mod. 63 A / D) (3/8") 9,52 mm 9 (mod. 58 C - 63 A / D) mm 10													
ENCLOSURE RATING	IP 67 cover side / IP 65 shaft side X													
OPTIONS	to be reported X													
OUTPUT TYPE	cable (standard length 0,5 m) P 8 pin M12 connector M12													
DIRECTION TYPE	radial R													
VARIANT	custom version XXX													
female connector included, without female please add 162 as variant code														



fixing clamps not included, please refer to Accessories section



() with M12 connector



ELECTRICAL SPECIFICATIONS

Multiturn resolution	12 bit
Singleturn resolution	8 / 10 / 12 bit
Power supply	7,6 ... 30 V DC
Power draw without load	< 400 mW
Output type*	RS-422 (SN65LBC179Q or equivalent)
Code type	binary or gray
Auxiliary inputs (U/D - Reset)	active high (+V DC) connect to 0 V if not used / Reset t_{min} 150 ms
Clock frequency	100 kHz ... 1 MHz
SSI monostable time (Tm)	20 μ s
SSI pause time (Tp)	> 35 μ s
SSI frame	tree format (MSB ... LSB) 25 bit length (12MT + 12ST + '0')
Accuracy	$\pm 0,35^\circ$ typical
Counting direction	decreasing clockwise (shaft view)
Start-up time	150 ms
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Shaft diameter	ϕ 6 mm / 9,52 mm (3/8") / 10 mm
Enclosure rating	IP 67 cover side / IP 65 shaft side (IEC 60529)
Max rotation speed	6000 rpm continuous
Max shaft load	10 N axial / 20 N radial with ϕ 6 shaft 100 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Moment of inertia	$0,5 \times 10^{-6}$ kgm ² (12×10^{-6} lbf ²)
Starting torque (at +20°C / +68°F)	< 0,03 Nm (4,25 Ozin)
Shaft material	AISI 303 stainless steel
Housing material	AISI 420 stainless steel
Bearing stage material	EN-AW 2011 aluminium
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-20° ... +85°C (-4° ... +185°F)
Weight	350 g (12,35 oz)

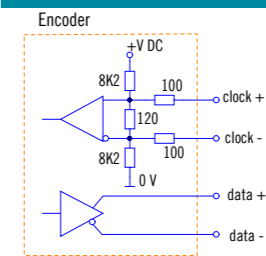
CONNECTIONS

Function	Cable	8 pin M12
+ V DC	red	8
0 V	black	5
data +	green	3
data -	brown	2
clock +	yellow	4
clock -	orange or pink	6
U / D	red / blue	7
RESET	white	1
\equiv	shield	housing

M12 connector (8 pin)
M12 A coded
solder side view FV



SSI SCHEMATICS



LINEAR TRANSDUCERS

HIGH RELIABILITY EVEN IN THE HEAVY ENVIRONMENTS.

Easy installation made easier for the presence of a groove in the housing potentiometer represent an ideal solution for the most used machine of material manufacture, for example injection press for plastic and gum.

ELTRA's linear transducers are engineered for high accuracy, high cycle-life and easy installation. Standard strokes are from 10 (4/10") mm to 1250 mm (4 ft).

ELTRA's linear transducers provide accurate sensing in a wide range of configurations. Rod style for fitting within hydraulic pistons or profile housing for a convenient mounting are available.

ELTRA's linear sensors feature absolute positioning, greater reliability, easy control, noise reduction, robustness, increased productivity, reduced shock and stress on mechanical parts, high precision for high performances, cost-effective solutions.

MAIN FEATURES

Incremental linear system based on optical or magnetic principle.
Easy mounting due to joint heads.

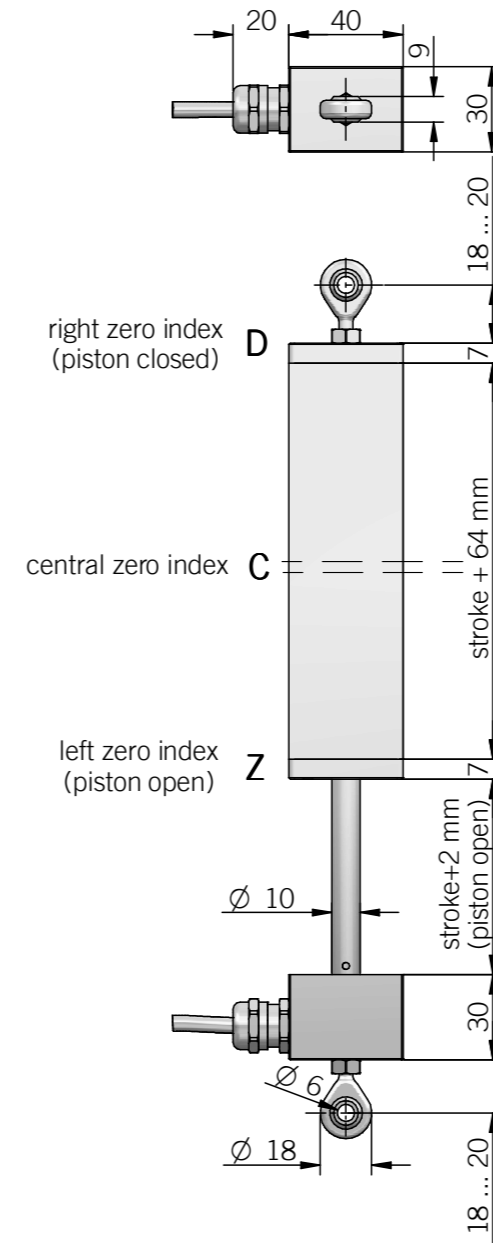
- 0,01 mm max resolution (after quad eval)
- Available with or without zero mark on left, right or central position
- Up to 1 m/s travel speed
- Working stroke up to 500 mm
- Cable output, connector available on cable end
- Mounting by joint heads



ORDERING CODE

ER	A	100	S	8/24	P	6	P	.XXX
SERIES incremental linear encoder ER								
RESOLUTION 0,2 mm A 0,1 mm B 0,04 mm C 1 mm D 0,5 mm E 0,2 mm F								
WORKING STROKE working stroke (mm) from 100 to 500								
ZERO PULSE without zero pulse S (mod. A) central zero index C (mod. A) right zero index (closed position) D (mod. A) left zero index (open position) Z								
POWER SUPPLY 5 V DC 5 8 ... 24 V DC 8/24								
ELECTRICAL INTERFACE (mod. A) NPN open collector C push-pull P line driver L								
FIXING HOLE DIAMETER mm 6								
OUTPUT TYPE radial cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after output type								
VARIANT custom version XXX								

A/B/C/D/E/F



dimensions in mm



ELECTRICAL SPECIFICATIONS

Technology	optical mod. A magnetic mod. B / C / D / E / F
Resolution	1 mm (0,25 mm after quad eval) 0,5 mm (0,125 mm after quad eval) 0,2 mm (0,05 mm after quad eval) 0,1 mm (0,025 mm after quad eval) 0,04 mm (0,01 mm after quad eval)
Linearity error	± 0,05 mm max (mod. A / F) ± 0,025 mm max (mod. B) ± 0,01 mm max (mod. C) ± 0,125 mm max (mod. E) ± 0,25 mm max (mod. D)
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	< 100 mA max
Max load current	50 mA / channel (NPN open) 20 mA / channel (push pull / line driver)
Output type*	NPN open collector (pull-up max +30 V DC) push-pull line driver HTL (AEIC-7272)
Max output frequency	100 kHz
Counting direction	A leads B (piston opening) mod. A B leads A (piston opening) mod. B / C / D / E / F
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Working stroke	100 - 150 - 200 - 250 - 300 - 350 - 400 - 500 mm
Enclosure rating	IP 64 (IEC 60529)
Travel speed	1 m/s max
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Rod material	1.4305 / AISI 303 stainless steel
Housing material	painted aluminum
Fixing	2 joint heads with ø 6 mm hole
Operating temperature	-10° ... +60°C (+14° ... +140°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	400 ... 1000 g (14,11 ... 35,27 oz)

CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
≡	shield	shield

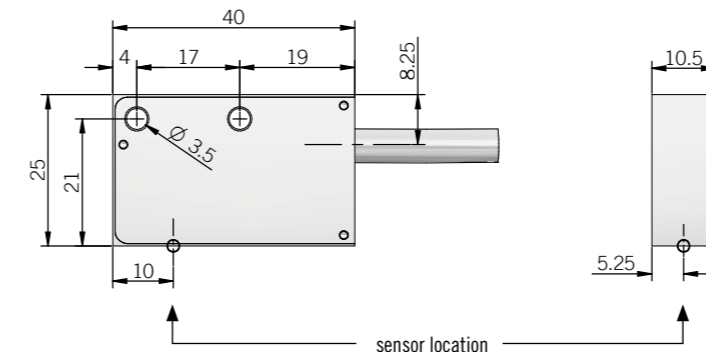
MAIN FEATURES

Incremental linear system based on magnetic principle without wear thanks to no-contact technology. Thanks to high IP rating ETMA is suitable for harsh environment applications such as marble and glass working machines, washing systems machines.

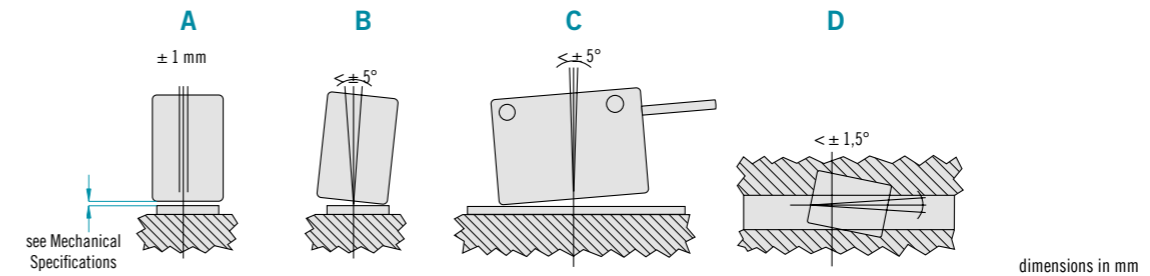
- 0,01 mm max resolution (after quad eval)
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 4 m/s travel speed
- IP 67 as protection grade
- Cable output, connector available on cable end



ETMA 1 / 2



Mechanical tolerances



ORDERING CODE

ETMA	1	Z	5	L	S	PR3	.XXX
SERIES magnetic incremental linear sensor ETMA							
RESOLUTION 0,1 mm 1 0,04 mm 2							
ZERO PULSE without zero pulse S with zero pulse Z							
POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28							
ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28 V - output RS-422 RS							
ENCLOSURE RATING IP 67 S							
OUTPUT TYPE cable length 3m PR3 preferred cable lengths 6 / 10 / 20 m, to be added after output type							
VARIANT custom version XXX							

ELECTRICAL SPECIFICATIONS

Resolution	ETMA1 = 0,1 mm (0,025 mm after quad eval) ETMA2 = 0,04 mm (0,01 mm after quad eval)
Zero pulse	ETMA1 = every 5 mm ETMA2 = every 2 mm
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Current consumption without load	30 mA max
Max load current	20 mA / channel
Output type *	push-pull / line driver HTL (AELC-7272) line driver RS-422 (AELT-5000 or equivalent)
Linearity error	± 0,025 mm (ETMA 1) ± 0,01 mm (ETMA 2)
Travel speed	4 m/s
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

Enclosure rating	IP 67 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Housing material	anodized aluminium
Fixing	n. 2 holes ϕ 3,5 mm
Operating temperature	-20° ... +85°C (-4° ... +185°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Working distance from magnetic tape	ETMA 1 < 1,5mm with magnetic tape protection ETMA 1 < 2mm without cover ETMA 2 < 0,5mm with magnetic tape protection ETMA 2 < 1mm without cover
Weight	150 g (5,29 oz)

CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red	red
0 V	black	black
Ch. A	green	green
Ch. A-	/	brown
Ch. B	yellow	yellow
Ch. B-	/	orange
Ch. Z	blue	blue
Ch. Z-	/	white
⊕	shield	shield



MAIN FEATURES

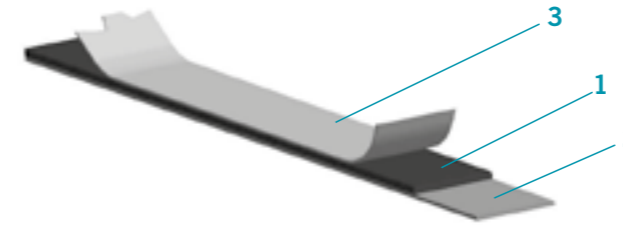
- Magnetic tape to be used with ETMA
- Easy mounting due to premounted double side adhesive
- 2 mm or 5 mm pole pitch
- High pole accuracy
- Available in reels up to 50 m



CONSTRUCTION

As shown in the figure below, Eltra magnetic tape is composed by three layers:

- 1 - a flexible magnetic tape made of elastomer filled with ferrite
- 2 - a stainless steel tape used to create a shield against any external magnetic fluxes and other external agents. Furthermore it's glued to the upper layer in order to give the correct mechanical rigidity to the magnetic tape. The stainless steel tape is supplied with an acrylic double side adhesive (thickness 0,13 mm) not shown in the figure
- 3 - a steel tape, magnetically transparent and with the function to protect mechanically the magnetic layer; it is the most rigid part and therefore is supplied separately due to transport and application needs. It must be stuck on the magnetic tape by the user. The steel tape is supplied with an acrylic double side adhesive (thickness 0,13 mm) not shown in the figure



To prevent damage from possible internal stresses in the magnetic tape rolled up with magnetic layer facing outwards, with a minimum internal diameter of 200 mm; keep of least 5 mm between the layers. If supplied in single strip keep at least 10 mm between the strips.

TIPS TO STICK THE MAGNETIC TAPE ON

Fixing pressure

The magnetic tape is adhesive. Therefore it is important an optimum contact between surfaces for right use. A good pressure must be uniformly applied to guarantee a perfect result.

Applying temperature

In order to guarantee optimal sticking it is recommended a surface temperature between +20°C and +37°C (+68°F to +98,6°F). Maximum adhesion is obtained after 72 hours at temperature of +21°C (+69,8°F). Please do not apply magnetic tape when surface temperature is lower than +10°C (+50°F).

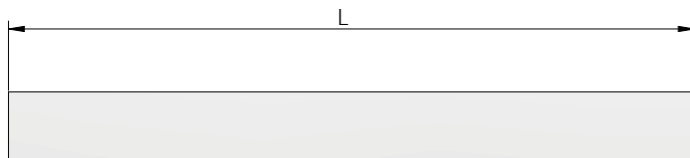
Application materials

Magnetic tape must be placed on dry, smooth and clean surfaces. Surfaces must be cleaned with aqueous solution (like water and alcohol 50% or heptane). Metallic surfaces like brass, copper etc. must be protected to prevent possible oxidation.

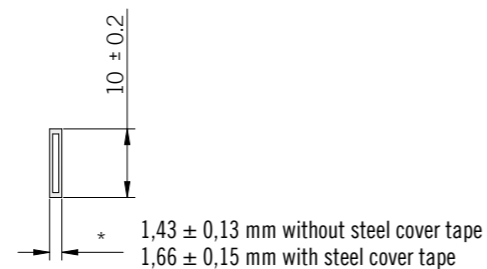
ORDERING CODE

EBM	A	1	-	10	.XXX
SERIES magnetic tape EBM	TAPE TYPE 10 mm width magnetic tape A	PITCH 5mm pitch for ETMA 1 1 2mm pitch for ETMA 2 2 separate the code with a dash -	TAPE LENGTH from 0,5 m to 50 m 10	VARIANT custom version XXX	

EBMA



dimensions in mm



GENERAL SPECIFICATIONS

Operating temperature	-20° ... +100°C (-4° ... +212°F)
Accuracy	± 40 µm/m
Linear expansion coefficient	17 x 10 ⁻⁶ m/K
Bending radius	> 65 mm without steel cover tape > 100 mm with steel cover tape

CHEMICAL AGENTS AND MAGNETIC TAPE BEHAVIOUR

Null effect	Medium effect	Strong effect
motor oil	JP-4 fuel	aromatic hydrocarbons (benzene, toluene, xylene, trichloroethylene, freon 10)
transmission oil	gasoline	ketones (acetone)
ATF (automatic transmission fluid)	heptane	mineral acids (hydrochloric, sulphuric, nitric, phosphoric, boric)
hydraulic oil	alcohols	
kerosene		
antifreeze		
detergents, disinfectants (Clorox®)		
turpentine		
water		
salt spray		

MAIN FEATURES

Rope encoder series with Dyneema rope available for lengths up to 4 m.
The applied encoder could be incremental or absolute.
Perfectly suitable also for harsh environments, thanks to its high mechanical strength.
It can be used in wide range of applications such as: vertical storehouses, presses, extruders, etc.



ORDERING CODE

FE 1500		A	.XXX
SERIES	rope encoder for linear measures FE		
WORKING STROKE	1,5 m 1500	4 m 4000	
TYPE OF ROPE END	eyelet A		
VARIANT	custom version XXX		

The encoder you wish to apply to the FE model needs to be ordered separately. The F letter will be placed before the standard ordering code.

- Example:
- 1) encoder model EH 30 M ordering code: FEH30M300S8/24P6X6PR
 - 2) encoder model EL 53 B ordering code: FEL53B1100S5/28P6X3MR
 - 3) encoder model EAM 53 B ordering code: FEAM53B16/4096G8/28PPX6X3MER

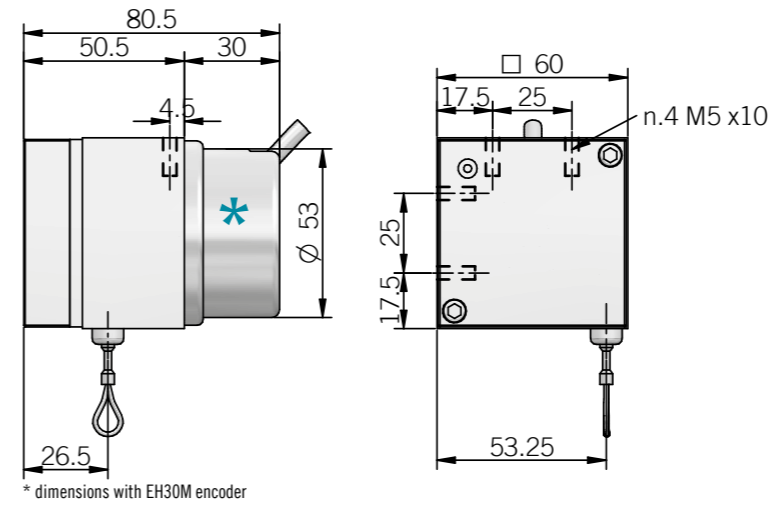
Complete ordering code example:
FE1500A-FEH30M300S8/24P6X6PR
For encoder specifications, refer to single product datasheet :
- EH 30 M see EH 30 M - EH 30 MH encoder
- EL 53 B see EL - ER 53 encoder
- EAM 53 B see EAM 58 - 63 solid shaft encoder

MECHANICAL SPECIFICATIONS

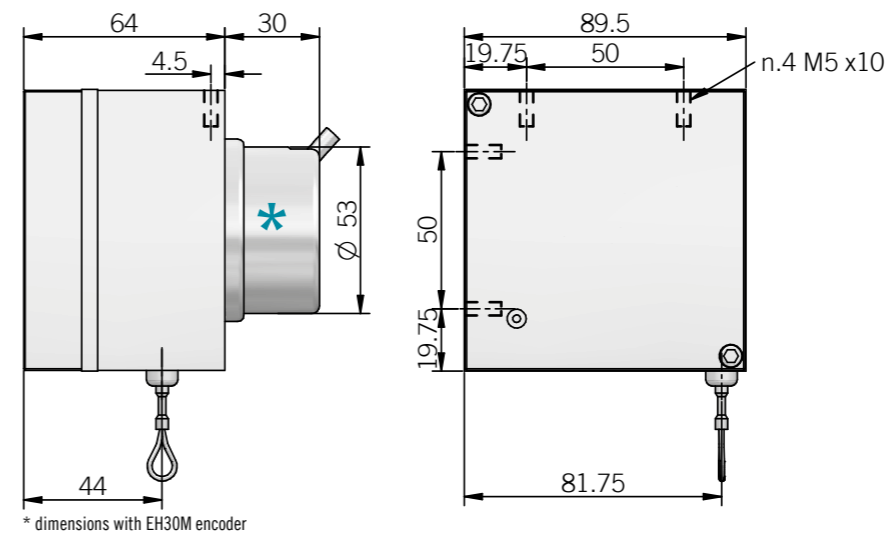
Model	FE 1500	FE 4000
Linearity error	± 0,75 mm	± 2 mm
Drum circumference	120 mm	220 mm
Max speed	0,85 m/s	
Pull-out force required	≥ 9 N	
Enclosure rating	depends on encoder IP	
Shock	50 G, 11 ms (IEC 60068-2-27)	
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)	
Housing material	painted aluminum	
Rope material	Dyneema®	
Operating temperature	-10° ... +60°C (+14° ... +140°F)	
Storage temperature	-25° ... +70°C (-13° ... +158°F)	
Weight	500 g (17,64 oz) mod. 1500	1100 g (38,80 oz) mod. 4000

Mechanical resolution [mm] = Drum circumference [mm] / Encoder pulses [ppr o singleturn resolution]

FE 1500

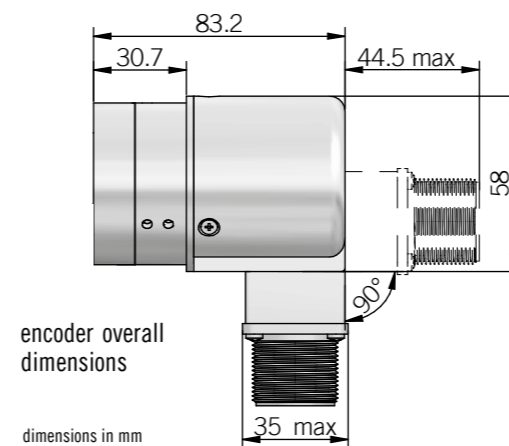


FE 4000



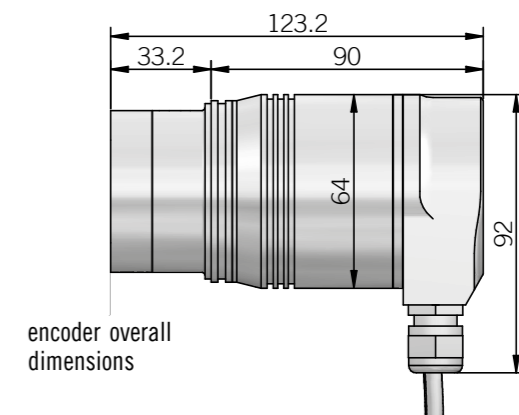
FEL 53 B

* incremental encoder application



FEAM 53 B

* multiturn absolute encoder application



MAIN FEATURES

Rope encoder series with steel rope available for lengths up to 15 m.
The attached encoder can be incremental or absolute.
Perfectly suitable also for harsh environments, thanks to its excellent mechanical strength.
It can be used in wide range of applications such as: vertical warehouses, presses, extruders, etc.



ORDERING CODE

FES 3000 A .XXX

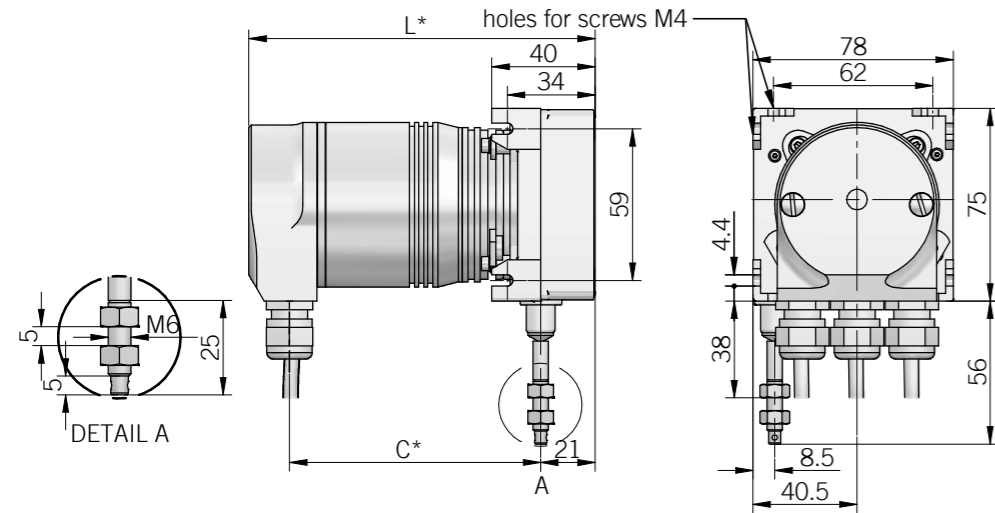
SERIES	rope encoder for linear measures FES
WORKING STROKE	3 m 3000 6 m 6000 15 m 15000
OUTPUT TYPE	horizontal output A
VARIANT	custom version XXX

Incremental or absolute (model 58B) must be ordered together. Please add letter F before standard encoder ordering code.

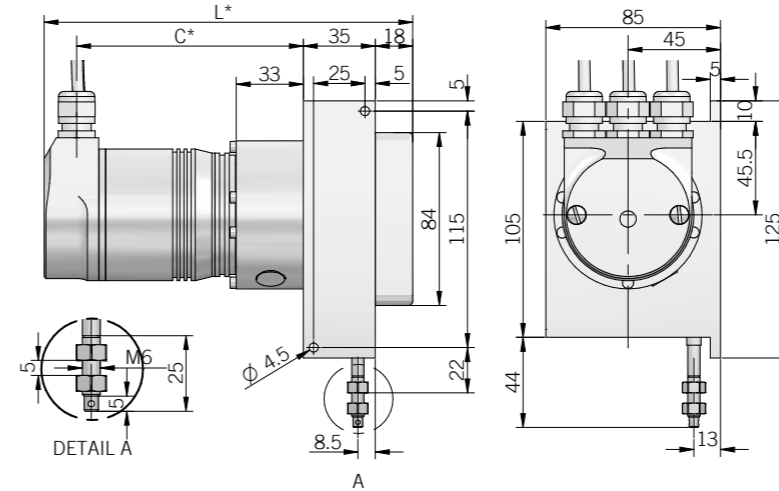
- Example:
- 1) with incremental encoder ordering code will be : FER58B ...
 - 2) with absolute multiturn encoder ordering code will be : FEAM58BR ...
 - 3) with absolute Profinet multiturn encoder ordering code will be : FAAM58B ...

Complete ordering code example:
FES3000A-FER58B ...

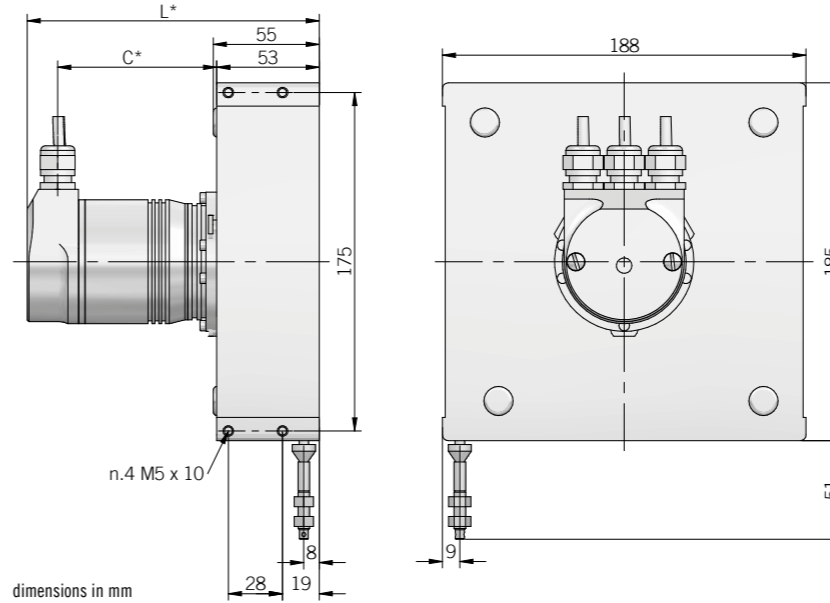
FES 3000



FES 6000



FES 15000



dimensions in mm

Installation notes

A 5 mm wire extension is recommended before the measurement starting point.
This prevents the wire snapping back to the stop on rewinding.
Wire should be pulled out straight in line with wire outlet.

MECHANICAL SPECIFICATIONS

Model	FES 3000	FES 6000	FES 15000
Max length measurement	3 m	6 m	15 m
Drum circumference	200 mm	200 mm	500 mm
Wire diameter	0,87 mm	0,54 mm	0,87 mm
Repeat accuracy	± 0,15 mm		± 0,25 mm
Max speed	0,8 m/s	3 m/s	2,4 m/s
Pull-out force required	≥ 3 N	≥ 8 N	≥ 15,5 N
Housing material	aluminum / plastic		aluminium die casting
Rope material	steel		steel rope, synthetically coated
Enclosure rating	depends on encoder IP		
Operating temperature	-40° ... +80°C (-40° ... +176°F)	-20° ... +80°C (-4° ... +176°F)	-40° ... +80°C (-40° ... +176°F)
Weight	350 g (12,35 oz) + encoder	700 g (24,69 oz) + encoder	2500 g (88,18 oz) + encoder
(EL-ER 58B) L*	95 mm	140 mm	114 mm
(EAM 58BR) L*	109 mm	154 mm	128 mm
(EAM 58B PROFIBUS) L*	135 mm	180 mm	154 mm
(EL-ER 58B) C*	58 mm	70 mm	99,5 mm
(EAM 58BR) C*	70 mm	82 mm	100,5 mm
(EAM 58B PROFIBUS) C*	98 mm	110 mm	127,2 mm

MAIN FEATURES

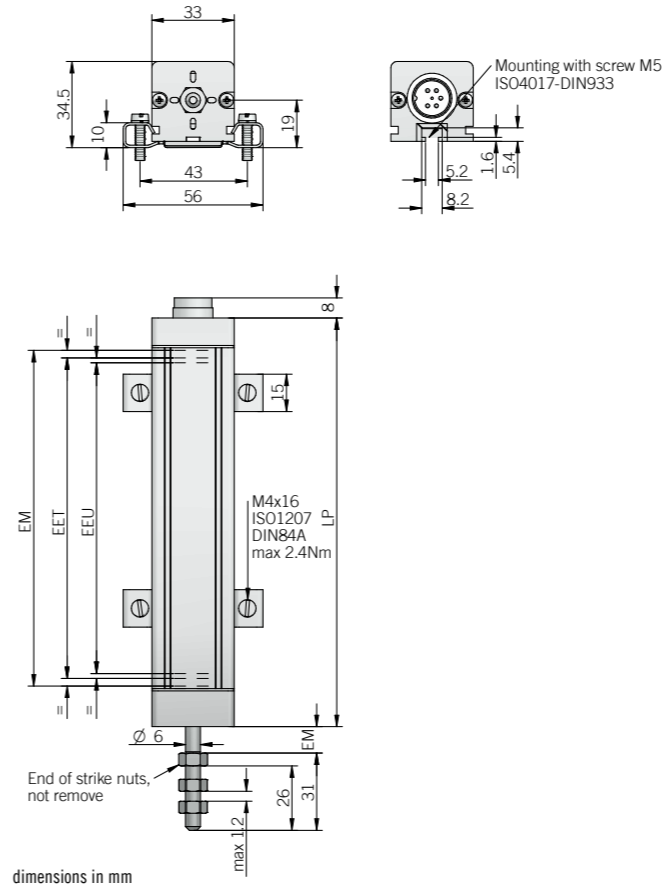
EPLA is an absolute linear potentiometer assuring great reliability even in tough applications with heavy vibrations and shocks. The groove on the enclosure of the transducer represents an excellent alternative to the usual system of fastening with brackets. Installation is also made simpler by the absence of variations on the electrical output signal outside of the theoretical electrical stroke. EPLA is the right solution in machinery for material processing such as injection presses for plastic, rubber and so on.



ORDERING CODE

EPLA	200	X	10	C5	A
SERIES linear potentiometer model EPLA					
STROKE mm from 50 to 900 see table for stroke availability					
ENCLOSURE RATING IP 60 X IP 65 S					
TRAVEL SPEED max 10 m/s 10					
OUTPUT TYPE cable (standard length 1 m) P 3 pin connector C3 DIN 43650-A 4 pin connector C4 DIN 43322 5 pin connector C5					
OUTPUT DIRECTION axial A					

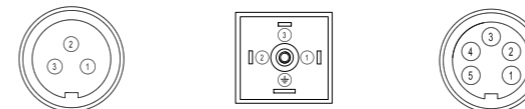
EPLA



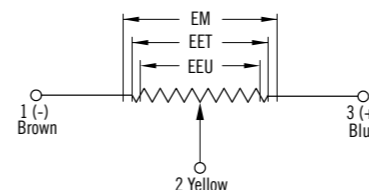
CONNECTIONS

Function	Cable	3 pin C3	4 pin C4	5 pin C5
+	blue	3	3	3
-	brown	1	1	1
output	yellow	2	2	2
nc	/	/	/	/
nc	/	/	/	/
⊕	shield	/	⊕	/

C3 connector (3 pin) solder side view FV C4 connector (4 pin) DIN 43650-A solder side view FV C5 connector (5 pin) DIN 43322 solder side view FV



- fixing kit (brackets, screws) included
- female connector not included, please refer to Accessories section



ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 µA
Resistance thermal coefficient	-200 ... 200 ppm / °C typical
Output voltage temperature coefficient	≤ 5 ppm / °C
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA
Applicable voltage	60 V DC max
Electrical insulation	> 100 MΩ, 500 V AC, 1 bar, 2 s
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1 bar, 2 s
RoHS	according to 2011/65/EU directive

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 300 - 350 - 400 - 450 - 500 - 600 - 750 - 900 mm
Useful electric stroke (EEU) (+ 3 / - 0 mm)	see model (mm)
Theoretical electric stroke (EET) (±1 mm)	EEU + 3 mm (50 ... 150), EEU + 4 mm (200 ... 300), 355 mm (350), 406 mm (400), 457 mm (450), 508 mm (500), 609 mm (600), 762 mm (750), 914 mm (900)
Mechanical stroke (EM)	EEU + 9 mm (50 ... 150), EEU + 10 mm (200 ... 300), 361 mm (350), 412 mm (400), 463 mm (450), 518 mm (500), 619 mm (600), 772 mm (750), 924 mm (900)
Resistance (on the EET)	5 kΩ (50 ... 600) 10 kΩ (750 ... 900)
Case length (LP)	EEU + 63 mm (50 ... 150), EEU + 64 mm (200 ... 300), 415 mm (350), 466 mm (400), 517 mm (450), 572 mm (500), 673 mm (600), 826 mm (750), 978 mm (900)
Travel speed	10 m/s max
Acceleration	200 m/s ² max
Enclosure rating	X = IP 60 (IEC 60529) S = IP 65 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force	3,5 N typical (IP 60) / 15 N typical (IP 65)
Housing material	anodized aluminium / Nylon 66 G
Pull shaft material	1.4305 / AISI 303 stainless steel
Mounting	brackets with variable center-to-center distance or M5 ISO4017 - DIN933 screw
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ manoeuvres
Operating temperature	-30° ... +100°C (-22° ... +212°F)
Storage temperature	-50° ... +120°C (-58° ... +248°F)

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN FEATURES

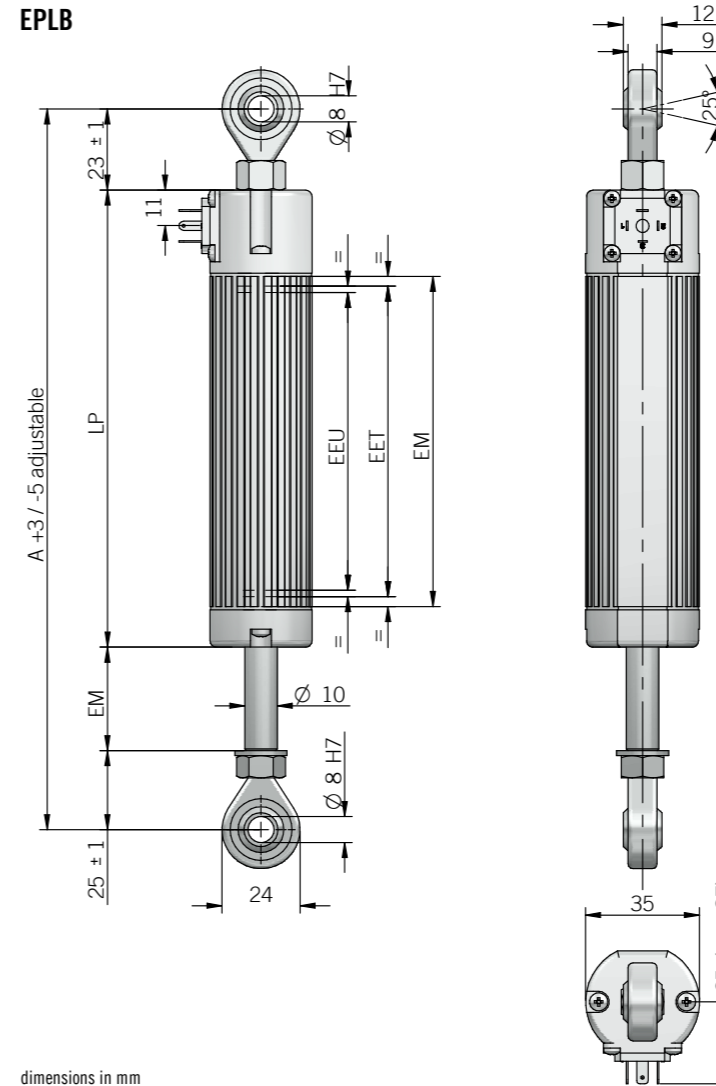
EPLB is an absolute linear potentiometer transducer. Mechanical mounting is made simpler by the presence of two spherical joints on the two sides and by the enclosure's cylindrical shape. The main characteristic is the absence of variations on the electrical output signal outside of the theoretical electrical stroke. Thanks to its robustness and precision EPLB represents a great solution in most mechanical application for automation.



ORDERING CODE

EPLB	300	S	5	P	R
SERIES cylindrical linear potentiometer model EPLB					
STROKE mm from 50 to 750 see table for stroke availability					
ENCLOSURE RATING IP 65 S					
TRAVEL SPEED max 5 m/s 5					
OUTPUT TYPE cable (standard length 1 m) P 3 pin connector C3 DIN 43650-C 4 pin connector C4 M16 DIN 45322 5 pin connector C5					
OUTPUT DIRECTION radial R					

EPLB

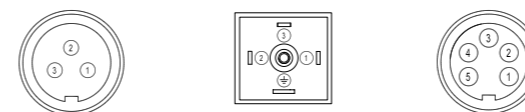


dimensions in mm

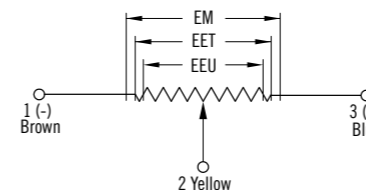
CONNECTIONS

Function	Cable	3 pin C3	4 pin C4	5 pin C5
+	blue	3	3	3
-	brown	1	1	1
output	yellow	2	2	2
nc	/	/	/	/
nc	/	/	/	/
⊥	shield	/	⊥	/

C3 connector (3 pin) solder side view FV
C4 connector (4 pin) DIN 43650-C solder side view FV
C5 connector (5 pin) DIN 45322 solder side view FV



female connector not included, please refer to Accessories section



ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 µA
Output voltage temperature coefficient	≤ 1,5 ppm / °C
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA
Applicable voltage	60 V max
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1 bar, 2 s
RoHS	according to 2011/65/EU directive

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 300 - 400 - 450 - 500 - 600 - 750 mm
Useful electric stroke (EEU) (+3/-0 mm)	see model (mm)
Theoretical electric stroke (EET) (±1 mm)	EEU + 3 mm (50 ... 150), EEU + 4 mm (200 ... 300), 406 mm (400), 457 mm (450), 508 mm (500), 609 mm (600), 762 mm (750)
Mechanical stroke (EM)	EEU + 9 mm (50 ... 150), EEU + 10 mm (200 ... 300), 412 mm (400), 463 mm (450), 518 mm (500), 619 mm (600), 772 mm (750)
Resistance (on the EET)	5 kΩ (50 ... 600) 10 kΩ (750)
Case length (LP)	EEU + 130,5 mm (50 ... 150), EEU + 131,5 mm (200 ... 300), 539,5 mm (400), 590,5 mm (450), 665,5 mm (500), 766,5 mm (600), 919,5 mm (750)
Minimum interaxis length (A)	EEU + 177 mm (50 ... 150), EEU + 178 mm (200 ... 300), 586 mm (400), 637 mm (450), 712 mm (500), 813 mm (600), 966 mm (750)
Travel speed	5 m/s max
Enclosure rating	IP 65 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force	≤ 15 N
Moving angle	± 25° max
Housing material	anodized aluminium / Nylon 66 G
Rod material	1.4305 / AISI 303 stainless steel
Mounting	n° 2 selfloading and selfaligning ball-joints
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ manoeuvres
Operating temperature	-30° ... +100°C (-22° ... +212°F)
Storage temperature	-50° ... +120°C (-58° ... +248°F)

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN CHARACTERISTICS

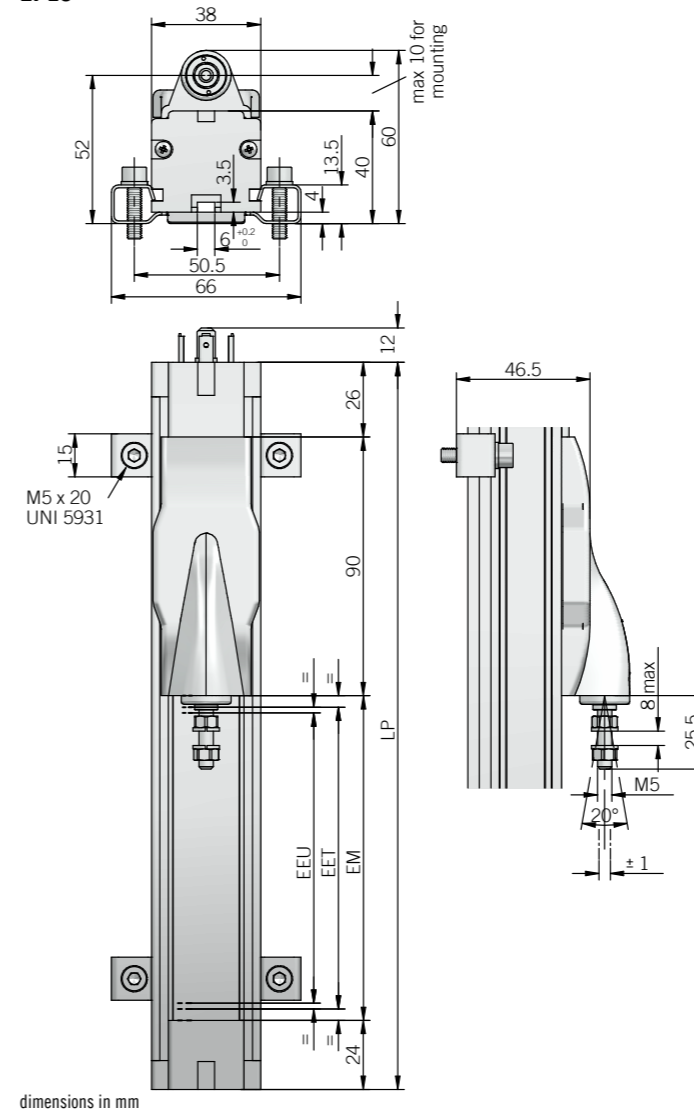
EPLC is an absolute linear potentiometer transducer without internal rod. This transducer is characterized by a cursor with integrated coupling sliding on the axis. The main characteristic is the absence of variations on the electrical output signal outside of the theoretical electrical stroke.



ORDERING CODE

EPLC		500	X	4	C4	A
SERIES	rodless linear potentiometer model EPLC					
STROKE	mm from 100 to 1500 see table for stroke availability					
ENCLOSURE RATING	IP 40 X					
TRAVEL SPEED	max 4 m/s 4 max 10 m/s 10					
OUTPUT TYPE	DIN 43650-A 4 pin connector C4 M16 DIN 43322 5 pin connector C5					
OUTPUT DIRECTION	axial A					

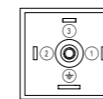
EPLC



CONNECTIONS

Function	4 pin C4	5 pin C5
+	3	3
-	1	1
output	2	2
nc	/	/
nc	/	/
⊕	⊕	/

C4 connector (4 pin)
DIN 43650-C
solder side view FV



C5 connector (5 pin)
DIN 45322
solder side view FV



- fixing kit (brackets, screws, grower) included
- female connector not included, please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 μA
Resistance temperature coefficient	-200 ... 200 ppm / °C typical
Output voltage temperature coefficient	≤ 5 ppm / °C typical
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA max
Applicable voltage	60 V max
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s
Dielectric strength	< 100 μA, 500 V AC, 50 Hz, 1bar, 2 s
RoHS	according to 2011/65/EU directive

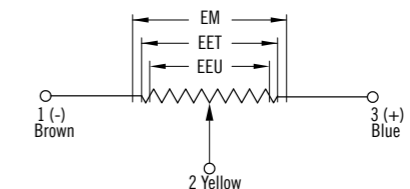
Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 μA

MECHANICAL SPECIFICATIONS

Stroke	100 - 150 - 200 - 300 - 400 - 500 - 600 - 700 - 850 - 900 - 1000 - 1250 - 1500 mm
Useful electric stroke (EEU) (+3/-0 mm)	see model (mm)
Theoretical electric stroke (EET) (±1 mm)	103 mm (100), 153 mm (150), 204 mm (200), 305 mm (300), 406 mm (400), 509 mm (500), 611 mm (600), 713 mm (700), 865 mm (850), 915 mm (900), 1017 mm (1000), 1271 mm (1250), 1521 mm (1500)
Mechanical stroke (EM)	EET + 10mm (100 ... 1500)
Resistance (on the EET)	5 kΩ (100 ... 300) 10 kΩ (400 ... 1000) 20 kΩ (1250 ... 1500)
Case length (LP)	EET + 150mm (100 ... 1500)
Travel speed	4 = 4 m/s max 10 = 10 m/s max
Acceleration	200 m/s ² max
Enclosure rating	IP 40 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force	≤ 1,2 N max
Housing material	anodized aluminium / Nylon 66 G 25
Mounting	brackets with variable center-to-center distance with M6 screw ISO4017 - DIN933
Operating temperature	-30° ... +100°C (-22° ... +212°F)
Storage temperature	-50° ... +120°C (-58° ... +248°F)

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

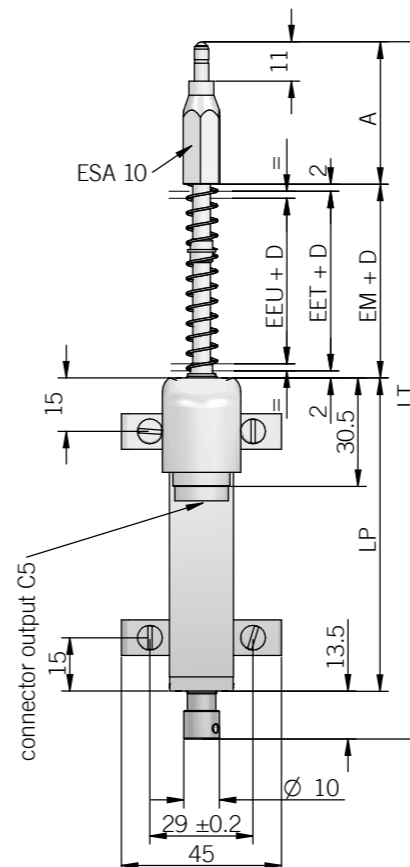
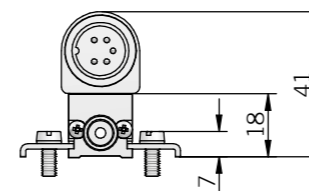


EPLT
LINEAR POTENTIOMETER WITH BALL TIP
MAIN CHARACTERISTICS

EPLT is an absolute linear potentiometer transducer. This model is characterized by the absence of cursor and the presence of a sensing system, composed by a moving rod, stainless steel sphere mounted on a threaded tip with a spring. This transducer is suitable for applications where short strokes are requested. The presence of the spring assures an automatic head positioning making this device suitable for being used in precise applications on cams or to control products coming from automatic production line. EPLT is also characterized by the absence of variations on the electrical output signal outside of the theoretical electrical stroke.


ORDERING CODE

ORDERING CODE	EPLT	100	X	10	P	A
SERIES	linear potentiometer with ball tip EPLT					
STROKE	10 / 25 / 50 / 75 / 100 please contact our offices for other strokes					
ENCLOSURE RATING	IP 40 X					
TRAVEL SPEED	max 10 m/s 10					
OUTPUT TYPE	cable (standard length 1 m) P M16 DIN 43322 5 pin connector C5					
OUTPUT DIRECTION	axial A					

EPLT


dimensions in mm

CONNECTIONS

Function	Cable P	5 pin C5
+	blue	3
-	brown	1
output	yellow	2
nc	/	/
nc	/	/
⊥	shield	/

 C5 connector (5 pin)
 DIN 45322
 solder side view FV


- fixing kit (brackets, M4x10 screws, washer) and tip with ball included
- female connector not included, please refer to Accessories section

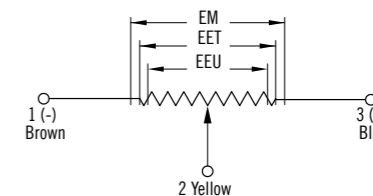
ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite					
Stroke	mm	10	25	50	75	100
Independent linearity	%	± 0,3	± 0,2	± 0,1	± 0,1	± 0,1
Resistance tolerance	± 20 %					
Recommended cursor current	< 0,1 µA					
Output voltage temperature coefficient	< 1,5 ppm / °C					
Power dissipation at 40 °C (0 W at +120 °C)	W	0,2	0,6	1,2	1,8	2,4
Max cursor current	10 mA max					
Max applicable voltage	V	14	25	60	60	60
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s					
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1bar, 2 s					
RoHS	according to 2011/65/EU directive					

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	mm	10	25	50	75	100
Useful electric stroke (EEU) (+1/-0 mm)	mm	10	25	50	76	101
Theoretical electric stroke (EET) (±1 mm)	mm	11	26	51	76	101
Mechanical stroke (EM)	mm	15	30	55	81	106
Resistance (on EET)	kΩ	1	1	5	5	5
Case length (LP)	mm	48	63	88	114	139
Sensing probe length	mm	32	32	40	40	40
Additional length (D)	mm	-	-	-	5	11
Total length (LT)	mm	108	138	196	251	307
Travel speed	10 m/s max					
Enclosure rating	IP 40 (IEC 60529)					
Shock	50 G, 11 ms (IEC 60068-2-27)					
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)					
Displacement force	≤ 4 N					
Housing material	anodized aluminium / Nylon 66 G 25					
Rod material	1.4305 / AISI 303 stainless steel					
Mounting	brackets with variable center-to-center distance					
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ operations					
Operating temperature	-30° ... +100°C (-22° ... +212°F)					
Storage temperature	-50° ... +120°C (-58° ... +248°F)					


Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN CHARACTERISTICS

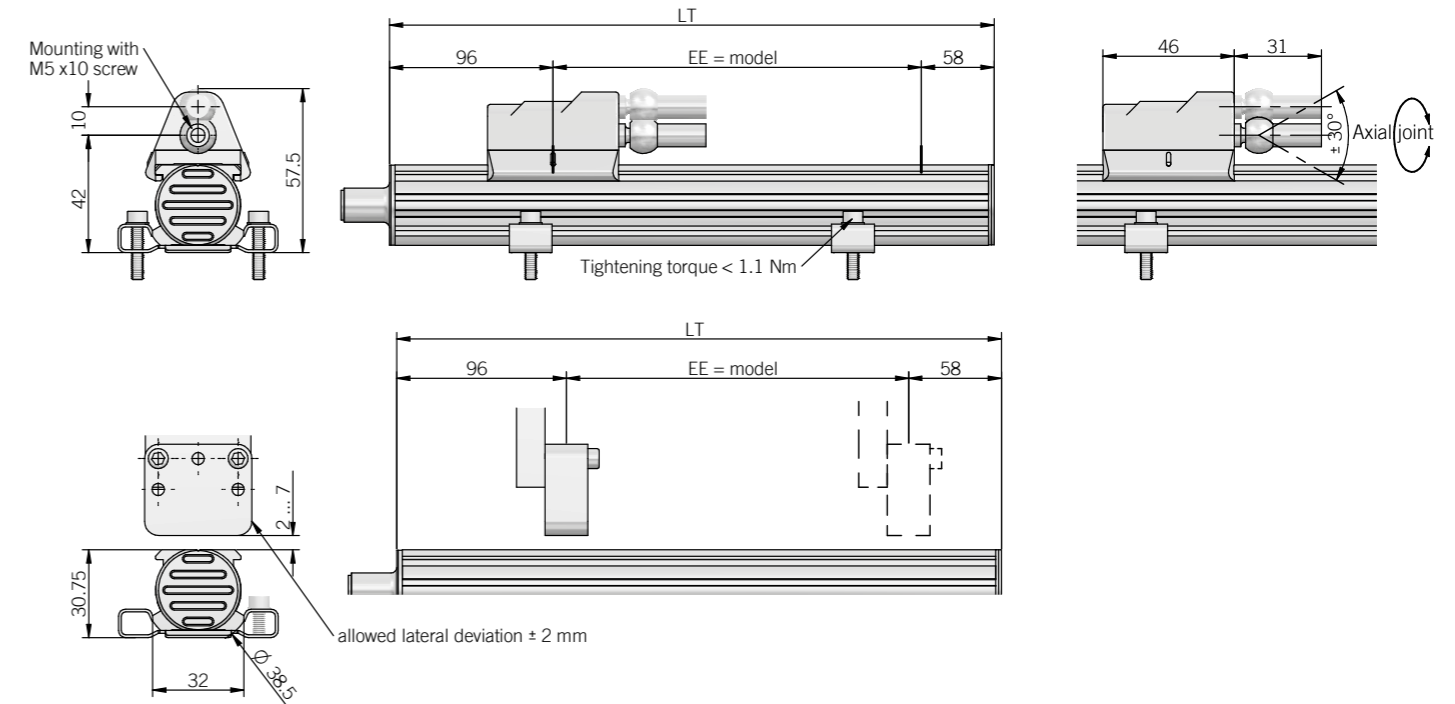
EMSPA is an absolute linear magnetostrictive transducer with analog interface. Thanks to the absence of electrical contact on the enclosure there is no issue of wear and deterioration during working life. Magnetostrictive technology guarantees great performances of speed and accuracy. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPA	500	S	20D	10	P	A
linear magnetostrictive transducer with analogue output EMSPA						
SERIES						
mm from 50 to 1500						
STROKE						
see table for stroke availability						
ENCLOSURE RATING						
IP 67 S						
OUTPUT SIGNAL						
0 ... 10 V DC / 1 cursor (standard) 10S						
0 ... 10 V DC / 1 cursor position/speed 10P						
0 ... 10 V DC / 2 cursors (min. stroke 400 mm) 10D						
4 ... 20 mA / 1 cursor 20S						
4 ... 20 mA / 1 cursor position/speed 20P						
4 ... 20 mA / 2 cursors (min. stroke 400 mm) 20D						
TRAVEL SPEED						
max 10 m/s 10						
OUTPUT TYPE						
cable (standard length 1 m) P						
M12 5 pin connector S5						
M12 8 pin connector S8						
M16 DIN 45322 6 pin connector C6						
M16 DIN 45326 8 pin connector C8						
OUTPUT DIRECTION						
axial A						

EMSPA



dimensions in mm

brackets, cursors and female connector not included, please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	16 bit (max electrical noise 5 mVpp)	
Output signal	0 ... 10 V DC	4 ... 20 mA
Output alarm value	10,5 V DC	21 mA
Output max value	12 V DC	30 mA
Power supply	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	70 mA max	90 mA max
Output load	5 kΩ	< 500 Ω
Output ripple	< 5 mVpp	
Independent linearity	$\leq \pm 0,01\%$ FS (min $\pm 0,060$ mm) typical with sliding cursor $\leq \pm 0,02\%$ FS with floating cursor (working distance 2 ... 5 mm) $\leq \pm 0,04\%$ FS with floating cursor (working distance 5 ... 7 mm)	
Repeatability	< 0,01 mm	
Hysteresis	< 0,01 mm	
Sampling time	0,5 ms (50 ... 300) 1 ms (350 ... 1100) 1,5 ms (1200 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	500 V DC	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimension (LT)	EE + 154 mm
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement / speed
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	min 0 ... 0,1 m/s max 0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	sliding or floating cursor
Temperature coefficient	0,005 % FS / °C
Operating temperature	-30° ... +75°C (-22° ... +167°F)
Storage temperature	-40° ... +100°C (-40° ... +212°F)

CONNECTIONS

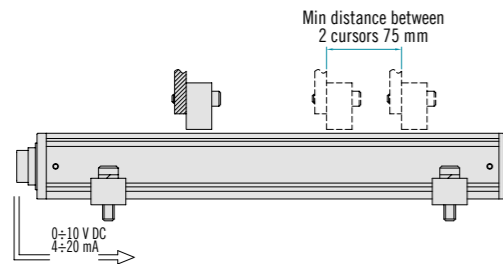
Function	Cable P	5 pin M12 S5	8 pin M12 S8	6 pin M16 C6	8 pin M16 C8
+ V DC	brown	5	7	5	7
0V	white	4	6	6	8
Output cursor 1 0 ... 10 V 4 ... 20 mA	grey	1	5	1	5 (1*)
0V cursor 1	pink	2	1	2	2
Inverse output cursor 1 Output cursor 2 Output speed 10 ... 0 V 20 ... 4 mA	yellow	3	3	3	3
0V Output cursor 1 Output cursor 2 Output speed	pink	2	2	4	6

S5 connector (5 pin) M12 A coded solder side view FV
S8 connector (8 pin) M12 A coded solder side view FV
C6 connector (6 pin) DIN 45322 solder side view FV
C8 connector (8 pin) DIN 45326 solder side view FV



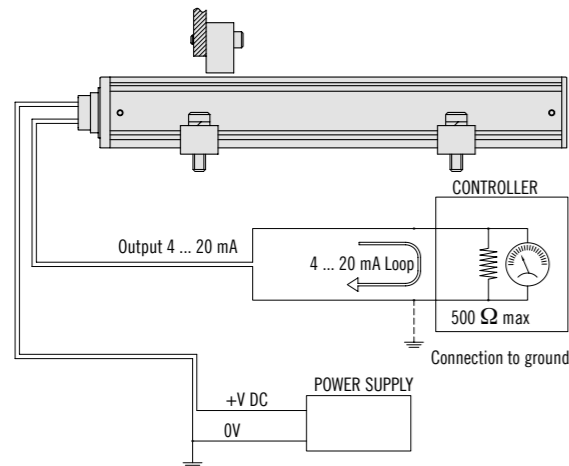
The transducer enclosure has to be connected to ground only on the control system side by the cable shield. To guarantee the correct electrical insulation of the transducer from the machine, always assemble the brackets using the plastic washers included.

Installation example with two cursors



For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel). The installation kit provides two screws, two nuts and two washers (all made of brass). The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 7 mm.

Current output application example



MAIN CHARACTERISTICS

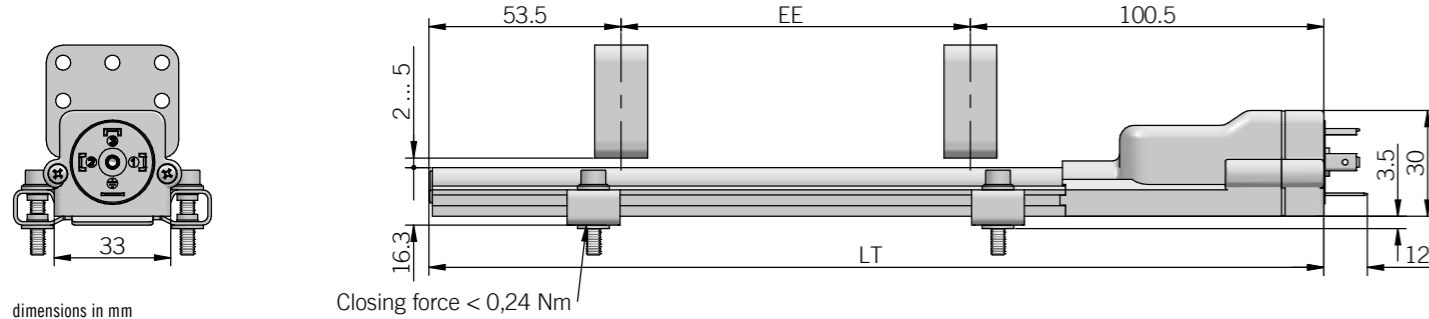
EMSPB is an absolute linear magnetostrictive transducer with analogue interface. Thanks to the absence of electrical contact on the enclosure there is no issue of wear and deterioration during working life. Magnetostrictive technology guaranties great performances of speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPB	1000	S	10S	10	C4	A
linear magnetostrictive transducer with analogue output						
SERIES EMSPB						
STROKE mm from 50 to 1500 see table for stroke availability						
ENCLOSURE RATING IP 65 S						
OUTPUT SIGNAL 0,1 ... 10,1 V DC / 1 cursor (standard) 10S 4 ... 20 mA / 1 cursor 20S						
TRAVEL SPEED max 10 m/s 10						
OUTPUT TYPE DIN 43650-A 4 pin connector C4 M12 5 pin connector S5						
OUTPUT DIRECTION axial A						

EMSPB



dimensions in mm

brackets, cursors and female connector not included, please refer to Accessories section

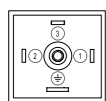
MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 225 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimension (LT)	EE + 154 mm
Enclosure rating	IP 65 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Shock	100 G, 11 ms, single shot (IEC 68000-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 68000-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	floating cursor
Temperature coefficient	≤ 0,01 % FS / °C (min. 0,015 mm / °C)
Operating temperature	-20° ... +75°C (-4° ... +167°F)
Storage temperature	-40° ... +100°C (-40° ... +212°F)

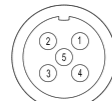
CONNECTIONS

Function	4 pin C4	M12 5 pin S5
+V DC	3	5
0 V	1	4
Output	2	1
OV output	/	2
⊥	shield	/

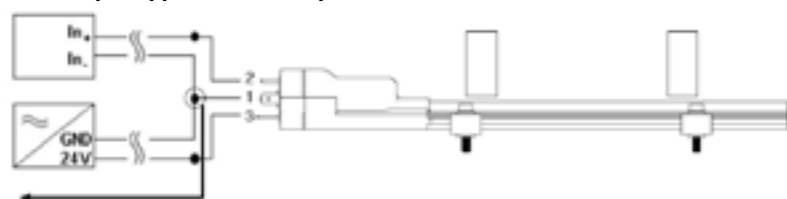
C4 connector (4 pin)
DIN 43650-A
solder side view FV



M12 connector (5 pin)
M12 A coded
solder side view FV



Current output application example



Note: connect as close as possible to transducer

ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite	
Output signal	0,1 ... 10,1 V DC	4 ... 20 mA
Output alarm value	10,5 V DC	21 mA
Output value max	12 V DC	30 mA
Power supply	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	35 mA max	60 mA max
Output load	≥ 10 kΩ	50 ... 500 Ω
Independent linearity	± 0,04 % FS max (min ± 0,09 mm)	
Repeatability	≤ 0,01 mm	
Hysteresis	≤ 0,02 mm	
Sampling time	1 ms (50 ... 600) 1,5 ms (650 ... 900) 2 ms (1000 ... 1300) 3 ms (1400 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	50 V DC	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

Installation notes

For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel). The installation kit provides two screws, two nuts and two washers (all made of brass).

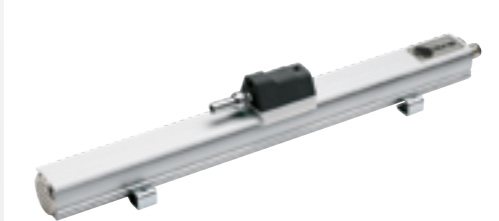
The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 5 mm.

MAIN CHARACTERISTICS

EMSPS is an absolute linear magnetostrictive transducer featuring a digital RS-422 SSI compliant output.

The main characteristic of magnetostrictive transducers is the absence of electric contact on the enclosure there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision.

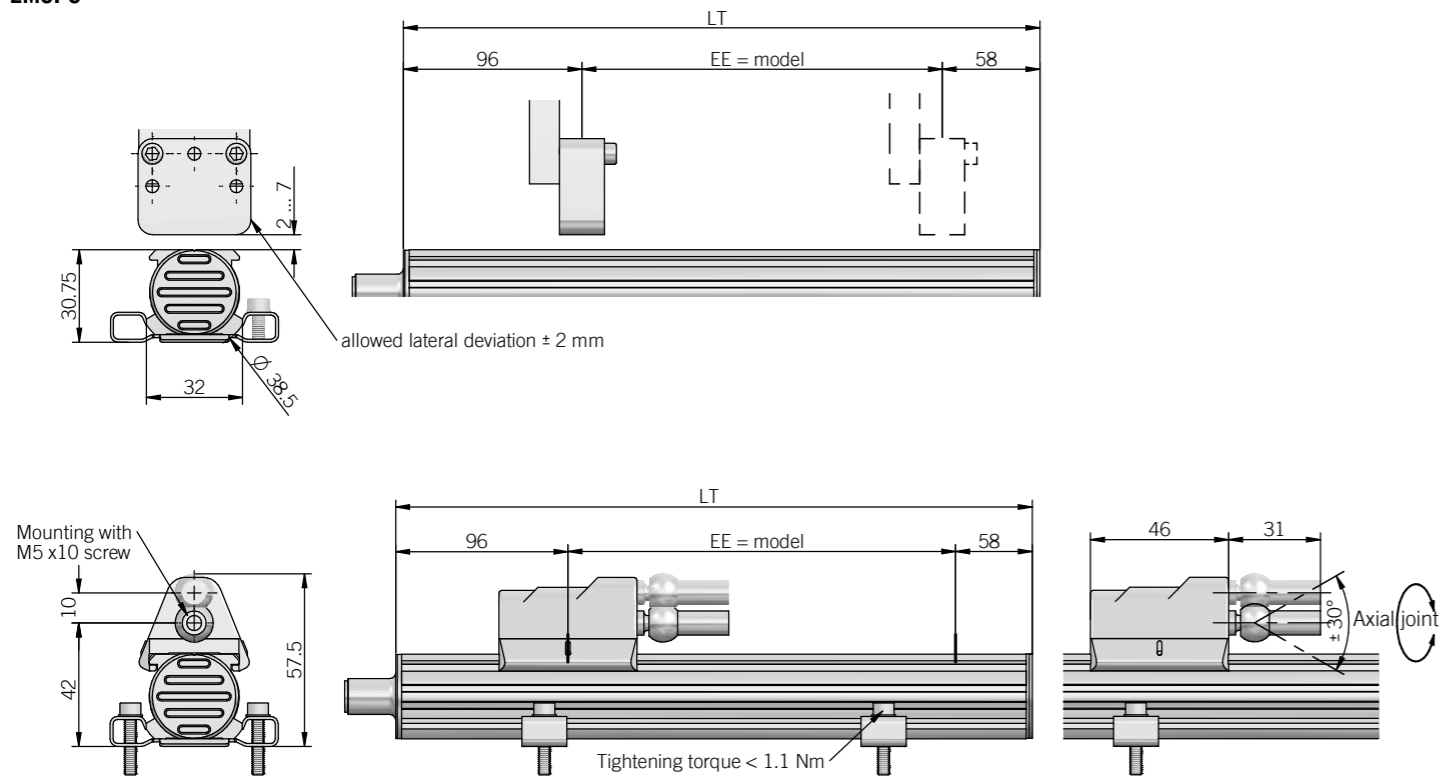
High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPS	500	S	25	G	10	R5	P	A
linear magnetostrictive transducer with SSI output	STROKE mm from 50 to 1500 see table for stroke availability	ENCLOSURE RATING IP 67 S	DATA LENGTH (FM357) 21+1 bit 21 24 bit 24 25 bit 25	CODE TYPE binary B gray G	TRAVEL SPEED max 10 m/s 10	RESOLUTION 0,002 mm R2 0,005 mm R5 0,010 mm R10 0,020 mm R20 0,040 mm R40	OUTPUT TYPE cable (standard length 1 m) P DIN 45322 M16 6 pin connector C6 DIN 45326 M16 8 pin connector C8 M12 8 pin connector S8	OUTPUT DIRECTION axial A

EMSPS



dimensions in mm
 · brackets, cursors and female connector not included, please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	2 - 5 - 10 - 20 - 40 μm
Independent linearity	≤ ± 0,01 % FS (min ± 0,060 mm) typical with sliding cursor ≤ ± 0,02 % FS typical with floating cursor
Repeatability	< 0,01 mm
Hysteresis	≤ ± 0,005 % FS (min 0,010 mm)
Power supply	10 ... 32 V DC
Power ripple	1 Vpp max
Max load current	50 mA max
Output type	RS-422
SSI output code	binary or gray
Clock frequency	50 kHz ... 1 MHz
SSI monostable time (Tm)	16 μs
SSI frame	21 / 24 / 25 bit data length
Counting direction	increase
Protection against overvoltage	yes
Protection against polarity inversion	yes
Self-resetting internal fuse	yes
Electrical insulation	500 V DC (+V DC / earth)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive

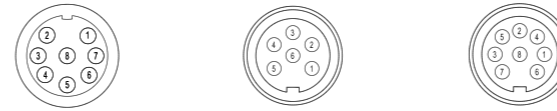
MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimensions (LT)	EE + 154 mm
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Scale orientation	increasing
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Shock	100 G, 11 ms, single shot (IEC 68000-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 68000-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	sliding or floating cursor
Temperature coefficient	20 ppm FS / °C
Operating temperature	-30° ... +90°C (-22° ... +194°F)
Storage temperature	-40° ... +100°C (-40° ... +212°F)

CONNECTIONS

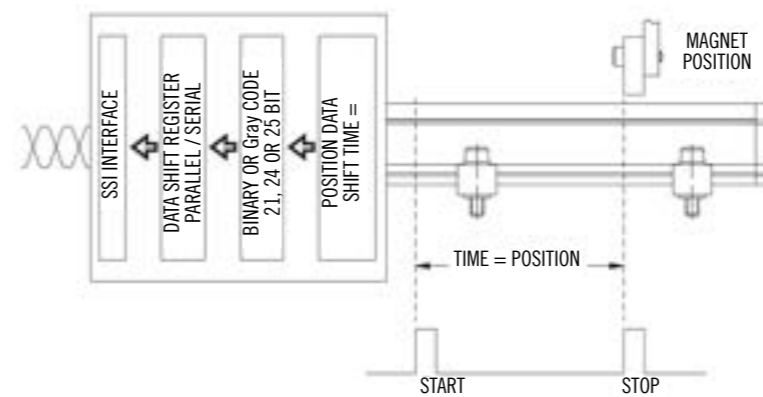
Function	Cable P	8 pin M12 S8	6 pin M16 C6	8 pin M16 C8
+ V DC	blue / white	7	5	7
OV	blue	6	6	6
data +	orange / white	2	2	2
data -	orange	5	1	5
clock +	green / white	3	3	1
clock -	green	1	4	3

S8 connector (8 pin) M12 A coded solder side view FV
 C6 connector (6 pin) DIN 45322 solder side view FV
 C8 connector (8 pin) DIN 45326 solder side view FV



The transducer enclosure and cable shield have to be connected to ground on both sides.

SSI BLOCK DIAGRAM

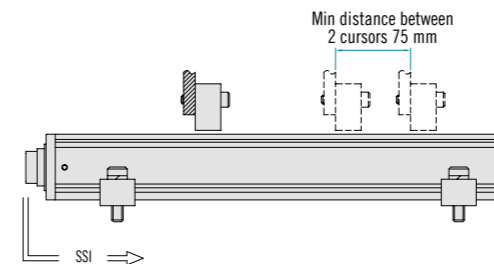


SSI output goes to 0 if the echo is absent (magnet out of measurement range or internal device error)

SSI CABLE LENGTH

Cable length	< 3 m	< 50 m	< 100 m	< 200 m	< 400 m
Baud rate	1 Mbaud	400 kbaud	300 kbaud	200 kbaud	100 kbaud

Installation example with two cursors



For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel). The installation kit provides two screws, two nuts and two washers (all made of brass). The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 7 mm.

MAIN CHARACTERISTICS

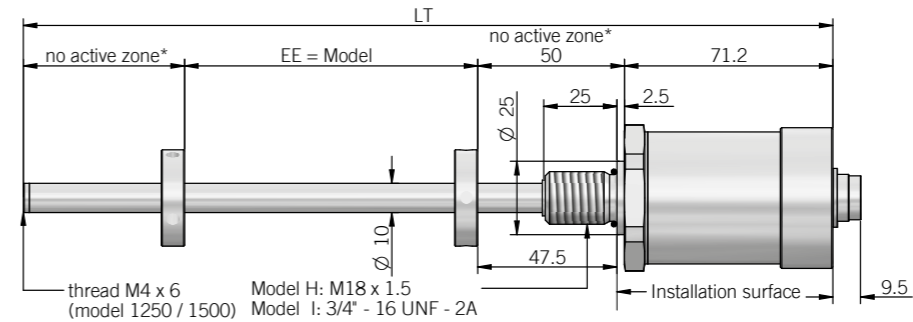
EMSSA is an absolute linear magnetostrictive transducer featuring an analogue interface. Main characteristics of magnetostrictive transducers is the absence of electric contact on the enclosure there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure. This series has been designed for being mounted internally to high applications (350 bar, 500 bar peak) such as hydraulic or pneumatic cylinders.



ORDERING CODE

EMSSA	500	S	10	H	10	P	A
linear magnetostrictive transducer with analogue output EMSSA							
SERIES							
mm from 50 to 1500 see table for stroke availability							
STROKE							
IP 67 S							
ENCLOSURE RATING							
0 ... 10 V DC 10 4 ... 20 mA 20							
OUTPUT SIGNAL							
M18 x 1,5 H 3/4" - 16 UNF I							
THREAD TYPE							
max 10 m/s 10							
DISPLACEMENT SPEED							
cable (standard length 1 m) P DIN 45322 M16 6 pin connector C6							
OUTPUT TYPE							
axial A							
OUTPUT DIRECTION							

EMSSA



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

dimensions in mm

- OR 15,4 x 2,1 (mod.H) / OR 16,36 x 2,21 (mod.I) included
- Cursors and female connector not included, please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	16 bit (max electrical noise 5 mVpp)	
Output signal	0 ... 10 V DC	4 ... 20 mA
Output alarm value	10,5 V DC	21 mA
Output value max	12 V DC	30 mA
Power supply	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	70 mA max	90 mA max
Output load	5 kΩ	< 500 Ω
Output ripple	< 5 mVpp	
Independent linearity	≤ ± 0,02 % FS (min ± 0,060 mm)	
Repeatability	< 0,01 mm	
Hysteresis	< 0,01 mm	
Sampling time	0,5 ms (mod. 50 ... 200) 1 ms (mod. 400 ... 1000) 1,5 ms (mod. 1250 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	500 V DC	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1250 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimensions (LT)	EE + 176,2 mm (mod. 50 ... 900) EE + 181,2 mm (mod. 1000 ... 1500)
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	min 0 ... 0,1 m/s max 0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Rod / housing material	1.4401 / AISI 316 stainless steel
Operative pressure	350 bar (500 bar peak)
Cursor type	floating cursor
Temperature coefficient	≤ 0,01 % FS / °C
Operating temperature	-30° ... +75°C (-22° ... +167°F)
Storage temperature	-40° ... +100°C (-40° ... +212°F)

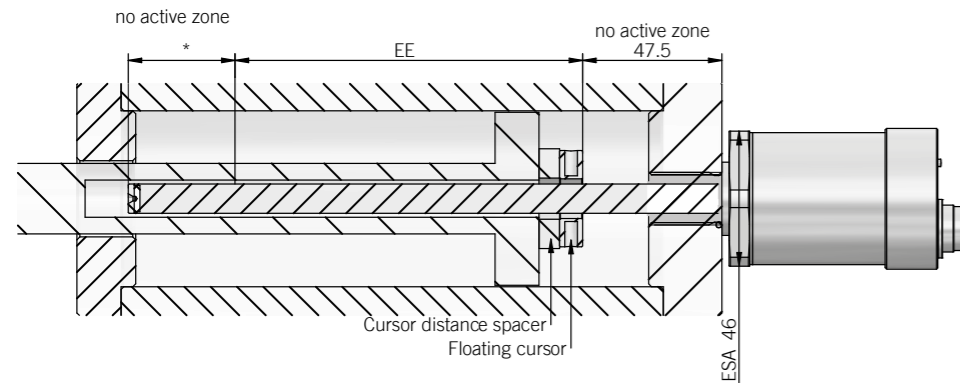
CONNECTIONS

Function	Cable P	6 pin M16 C6
+ V DC	brown	5
OV	white	6
Output cursor 1 0 ... 10 V 4 ... 20 mA	grey	1
OV cursor 1	pink	2
Inverse output cursor 1 10 ... 0 V 20 ... 4 mA	yellow	3
OV inverse output cursor 1	pink	4

C6 connector (6 pin)
DIN 45322
solder side view FV



Cylinder mounting example



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

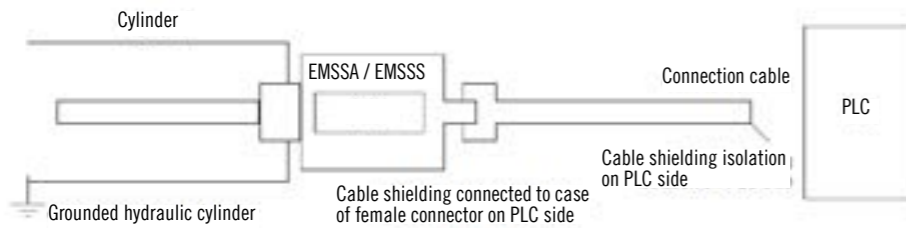
For correct installation of rod-type magnetostrictive transducers in hydraulic cylinders, remember that the cylinder head must be made of non-magnetic material where the threaded hole will be drilled to install the transducer. If not, the residual magnetisation caused by drilling the threaded hole must be less than 4 Gauss. Sealing surface must be free from scratches longitudinal or spiral

Ro 1,6 µm for sealing with non pulsating pressure
Ro 0,8 µm for seals with pulsating pressure

Suggested o-ring (model H)
Parker 6-349 15,4 x 2,1
Material: Viton 90° Shore A
Mixes: Parker N552-90

Suggested o-ring (model I)
Parker 3-908 16,36 x 2,21
Material: Viton 90° Shore A
Mixes: Parker N552-90

Electrical connection example



The transducer must be installed away from sources of magnetic fields, both static and 50 Hz (electric motors, solenoids, etc.).

- with floating cursor assembly support must be made with nonmagnetic material
- the transducer connection cable must be wired separate from power cables and/or solenoid controls, drives, or remote switches
- power supply must be drawn from dedicated power supply and connected directly to power terminals as near as possible
- since the transducer cursor is a magnet, make sure there are no iron filings or small fragments of magnetic metal near the transducer. This could produce an accumulation of material on the cursor, with consequent sliding problems
- if the transducer is installed in a cylinder isolated from the ground, the cable shielding on PLC side must be grounded
- with multiple cursors (two or more), cursors distance must be minimum 75 mm each

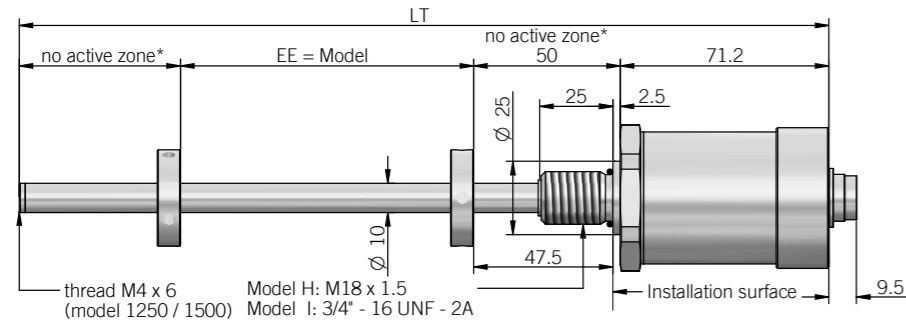
MAIN CHARACTERISTICS

EMSSS is an absolute linear magnetostrictive transducer featuring a SSI output. Main characteristics of magnetostrictive transducer is the absence of electric contact on the enclosure so there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure. This series has been designed for being mounted internally to high pressure (350 bar, 500 bar peak) such as hydraulic or pneumatic cylinders.



ORDERING CODE	EMSSS	500	S	24	G	H	10	R5	P	A
	linear magnetostrictive transducer with SSI output									
	SERIES	EMSSS								
	STROKE	mm from 100 to 1500								
		see table for stroke availability								
	ENCLOSURE RATING	IP 67	S							
	DATA LENGTH	(FM357) 21+1 bit	21							
			24 bit	24						
			25 bit	25						
	CODE TYPE	binary	B							
		gray	G							
	THREAD TYPE	M18 x 1,5	H							
		3/4" - 16 UNF	I							
	DISPLACEMENT SPEED	max speed 10 m/s	10							
	RESOLUTION	0,005 mm	R5							
		0,010 mm	R10							
		0,020 mm	R20							
		0,040 mm	R40							
	OUTPUT TYPE	cable (standard length 1 m)	P							
		DIN 45322 M16 6 pin connector	C6							
	OUTPUT DIRECTION	axial	A							

EMSSS



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

dimensions in mm

- OR 15,4 x 2,1 (mod.H) / OR 16,36 x 2,21 (mod.I) included
- Cursors and female connector not included, please refer to Accessories section

ELECTRICAL SPECIFICATIONS

Resolution	5 - 10 - 20 - 40 µm
Independent linearity	≤ ± 0,02 % FS (min ± 0,060 mm)
Repeatability	< 0,01 mm
Hysteresis	≤ ± 0,005 % FS (min 0,010 mm)
Sampling time	1 ms (mod. 100 ... 1000) 2 ms (mod. 1250 ... 1500)
Power supply	10 ... 32 V DC
Power ripple	1 Vpp max
Max load current	50 mA max
Output type	RS-422
SSI output code	binary or gray
Clock frequency	50 kHz ... 1 MHz
SSI monostable time (Tm)	16 µs
SSI frame	21 / 24 / 25 bit data length
Counting direction	increase
Protection against overvoltage	yes
Protection against polarity inversion	yes
Self-resetting internal fuse	yes
Electrical insulation	500 V DC (+V DC / earth)
Electromagnetic compatibility	according to 2014/30/EU directive
Electromagnetic	according to 2011/65/EU directive

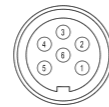
MECHANICAL SPECIFICATIONS

Stroke	100 - 150 - 200 - 300 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1250 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimensions (LT)	EE + 176,2 mm (mod. 100 ... 1000) EE + 181,2 mm (mod. 1250 ... 1500)
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	min 0 ... 0,1 m/s max 0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Rod / housing material	1.4401 / AISI 316 stainless steel
Operative pressure	350 bar (500 bar peak)
Cursor type	floating cursor
Temperature coefficient	20 ppm FS / °C
Operating temperature	-30° ... +90°C (-22° ... +194°F)
Storage temperature	-40° ... +100°C (-40° ... +212°F)

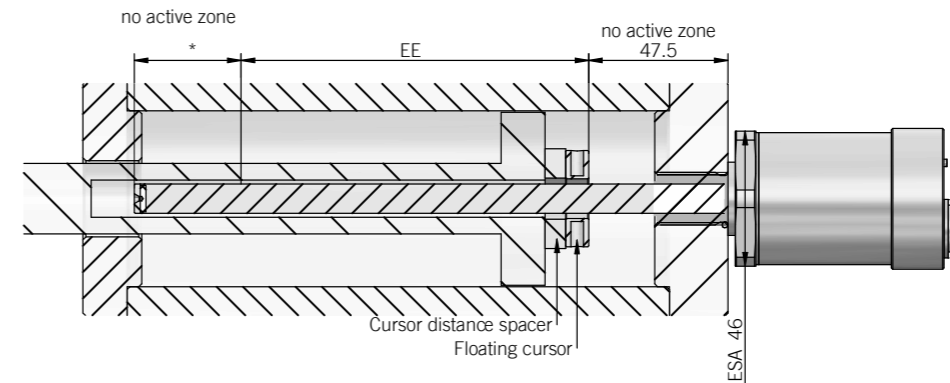
CONNECTIONS

Function	Cable P	6 pin M16 C6
+ V DC	blue / white	5
OV	blue	6
Data +	brown / white	2
Data -	orange	1
Clock +	green / white	3
Clock -	green	4

C6 connector (6 pin)
DIN 45322
solder side view FV



Cylinder mounting example



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

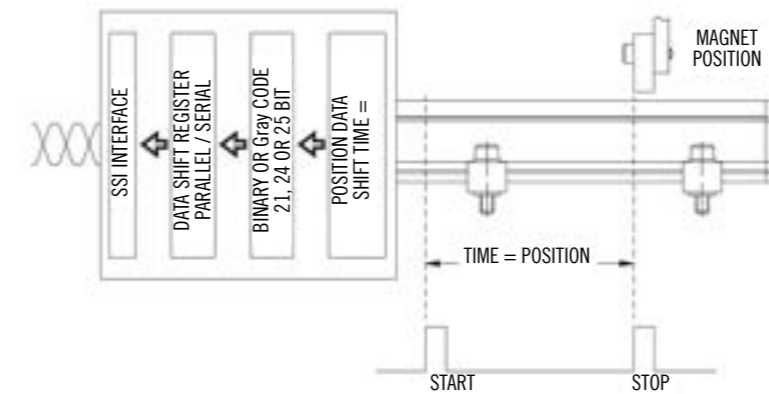
For the correct installation of rod-type magnetostrictive transducers in hydraulic cylinders, remember that the cylinder head must be made of non-magnetic material where the threaded hole will be drilled to install the transducer. If not, the residual magnetisation caused by drilling the threaded hole must be less than 4 Gauss. Sealing surface must be free from scratches longitudinal or spiral

- Ro 1,6 µm for sealing with non pulsating pressure
- Ro 0,8 µm for seals with pulsating pressure

Suggested o-ring (model H)
Parker 6-349 15,4 x 2,1
Material: Viton 90° Shore A
Mixes: Parker N552-90

Suggested o-ring (model I)
Parker 3-908 16,36 x 2,21
Material: Viton 90° Shore A
Mixes: Parker N552-90

SSI BLOCK DIAGRAM



SSI output goes to 0 if the echo is absent (magnet out of measurement range or internal device error)

SSI CABLE LENGTH

Cable length	< 3 m	< 50 m	< 100 m	< 200 m	< 400 m
Baud rate	1 Mbaud	400 kbaud	300 kbaud	200 kbaud	100 kbaud

Installation notes

The transducer must be installed away from sources of magnetic fields, both static and 50 Hz (electric motors, solenoids, etc.).

- with floating cursor assembly support must be made with nonmagnetic material
- the transducer connection cable must be wired separate from power cables and/or solenoid controls, drives, or remote switches
- power supply must be drawn from dedicated power supply and connected directly to power terminals as near as possible
- since the transducer cursor is a magnet, make sure there are no iron filings or small fragments of magnetic metal near the transducer. This could produce an accumulation of material on the cursor, with consequent sliding problems
- cable shield must be connected on both sides (PLC and transducer)
- if the transducer is installed in a cylinder isolated from the ground, the cable shielding on PLC side must be grounded.

OTHER PRODUCTS



SPECIAL PRODUCTS FOR DIFFERENT APPLICATION'S NEEDS.

Complementing the extensive range of incremental, absolute and linear transducers, Eltra also offers specific products and adaptation boards to match precise factory

automation application needs.

MAIN FEATURES

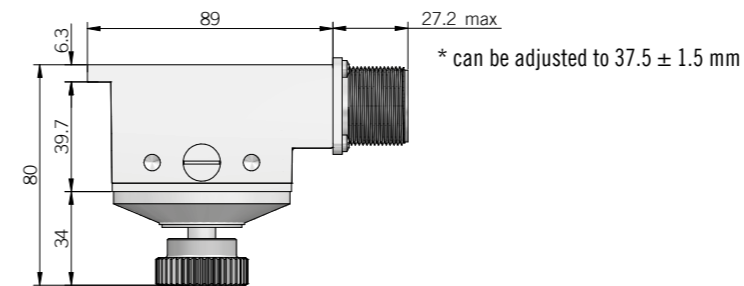
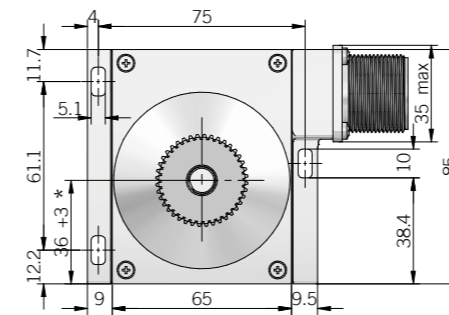
Encoder for rack with automatic slack recovery. If compared to an incremental linear system, this type of encoder extremely simplifies linear measurements and overcomes measurement problems on long distance.

Encoder is sealed in a solid aluminium body and integrate a preloading system that allows automatic slack recovery between rack and pinion.

- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 220 kHz output frequency
- Cable or connector output



34A



for rack and cogged wheel please refer to Accessories section

dimensions in mm

MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 10 mm
Enclosure rating	IP 64 (IEC 60529)
Max rotation speed	3000 rpm
Max shaft load	200 N axial / radial
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Starting torque (at +20°C / +68°F)	< 0,06 Nm (8,50 Ozin)
Housing material	painted aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Rack and cogged wheel material	steel
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-20° ... +70°C (-4° ... +158°F)
Storage temperature	-25° ... +70°C (-4° ... +158°F)
Weight	700 g (24,69 oz)

ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 2500 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 30 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	50 mA / channel 20 mA / channel (line driver)
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	220 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	certificate n. E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RESOLUTIONS

100 - **200** - 300 - 360 - 400 - **500** - 512 - 600 - 720 - **1000** - 1024 - 1200 - 1440 - **2000** - 2048 - 2500

please directly contact our offices for other pulses, preferred resolutions in bold

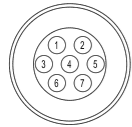
ORDERING CODE

EC	34A	500	S	8/24	P	10	P	.XXX
SERIES encoder for rack EC	MODEL flange 34A	RESOLUTION ppr 100 ... 2500 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 8/24V - output RS-422 RS	SHAFT DIAMETER mm 10	OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after output type MIL connector M JIS-C-5432 connector J female connector included, without female please add 162 as variant code	VARIANT custom version XXX

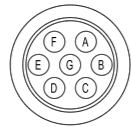
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero
+V DC	red	red	6	4	F	D	4 - 5	D - E
0 V	black	black	1	6	A	F	6	F
Ch. A	green	green	3	1	C	A	1	A
Ch. A-	/	brown	/	3	/	C	7	G
Ch. B	yellow	yellow	5	2	E	B	2	B
Ch. B-	/	orange	/	5	/	E	8	H
Ch. Z	blue	blue	4	/	D	/	3	C
Ch. Z-	/	white	/	/	/	/	9	I
⏏	shield	shield	7	7	G	G	10	J

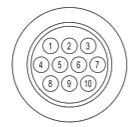
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



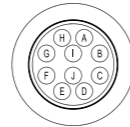
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



MAIN FEATURES

Measuring wheel series designed for specific industrial applications where is required to measure a linear movement (i.e. continuous sheet cutting machines of wood, textiles, glass, etc.). The body is entirely designed of aluminium and mounted using an oscillating arm pivoted on the shaft. The weight of the metric wheel keeps a stable contact with the material, allowing an accurate measurement of both length and speed. Wheel surface can be in crossed-knurl aluminium, special anti-oil or anti-sliding rubber.

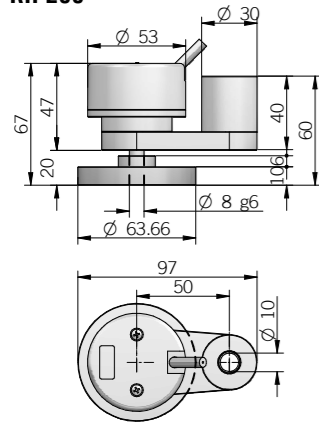
- 3 channel encoder (A / B / Z) up to 1024 ppr
- Power supply up to +24 V DC with several electrical interfaces available
- Up to 105 kHz output frequency
- Compact size
- Cable output



ORDERING CODE

ORDERING CODE	RH200	A	500	S	8/24	P	8	X	3	PR	.XXX
200 mm measuring wheel - RH series	MODEL RH200										
	WHEEL SURFACE smooth A knurled B rubberized C without wheel /										
	RESOLUTION ppr from 50 to 1024 see table for pulses availability										
	ZERO PULSE without zero pulse S with zero pulse Z										
	POWER SUPPLY (with L electrical interface) 5 V DC 5 8 ... 24 V DC 8/24										
	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L										
	SHAFT DIAMETER mm 8										
	ENCLOSURE RATING IP 54 X										
	MAX ROTATION SPEED 3000 rpm 3										
	OUTPUT TYPE cable (standard length 0,5 m) PR preferred cable lengths 1,5 / 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)										
	VARIANT custom version XXX										

RH 200



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 50 to 1024 ppr
Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L = 20 mA / channel
Output type*	NPN open collector (pull-up max +30V DC) push-pull line driver HTL (AEIC-7272)
Max output frequency	105 kHz
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA certificate	E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RH SERIES RESOLUTIONS

50* - **100** - **200** - 250 - 400 - **500** - 512 - **1000** - **1024**

*available only without zero pulse
please directly contact our offices for other pulses, preferred resolutions in bold

MECHANICAL SPECIFICATIONS

Shaft diameter	ø 8 mm
Enclosure rating	IP 54 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms up to 2500 ppr (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Starting torque (at +20°C / +68°F)	< 0,01 Nm (1,42 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Housing material	PA66 glass fiber reinforced
Shaft material	1.4305 / AISI 303 stainless steel
Support material	EN-AW 2011 aluminum
Wheel material	EN-AW 2011 aluminum
Bearings	2 ball bearings
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +70°C (+14° ... +158°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Encoder + support weight	250 g (8,82 oz)
Wheel weight	90 g (3,17 oz)

MAIN FEATURES

Measuring wheel series designed for specific industrial applications where is required to measure a linear movement (i.e. continuous sheet cutting machines of wood, textiles, glass, etc.). The body is entirely designed of aluminium and mounted using an oscillating arm pivoted on the shaft. The weight of the metric wheel keeps a stable contact with the material, allowing an accurate measurement of both length and speed. Wheel surface can be in crossed-knurl aluminium, special anti-oil or anti-sliding rubber.

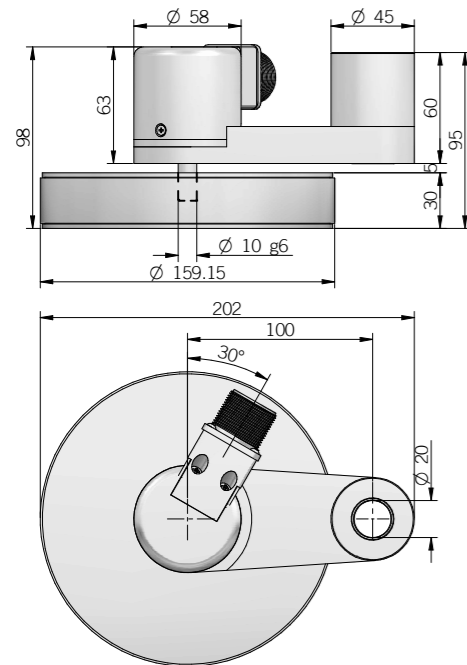
- 3 channel encoder (A / B / Z) up to 10000 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 500 kHz output frequency
- Model RM with internal coupling
- Cable or connector output



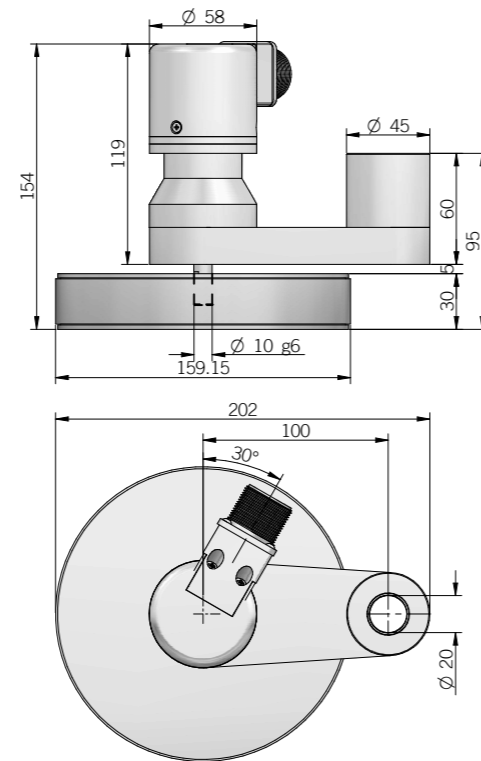
ORDERING CODE

MODEL 500 mm measuring wheel - RL series RL500 500 mm measuring wheel - RM series RM500	WHEEL SURFACE smooth A knurled B rubber belt C without wheel /	RESOLUTION (mod. RL) ppr from 10 to 2500 (mod. RM) ppr from 1 to 10000 see table for pulses availability	ZERO PULSE without zero pulse S with zero pulse Z	POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	ELECTRICAL INTERFACE NPN open collector C push-pull P line driver L power supply 5/28V - output RS-422 RS	SHAFT DIAMETER mm 10	ENCLOSURE RATING IP 64 X IP 66 S	MAX ROTATION SPEED 3000 rpm 3	OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) MIL connector M JIS-C-5432 connector J M12 connector M12 M23 connector H IP40 IEC 60130-9 connector C female connector included, without female please add 162 as variant code	DIRECTION TYPE axial A radial R	VARIANT custom version XXX
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RL 500



RM 500



dimensions in mm

ELECTRICAL SPECIFICATIONS

Resolution	from 1 to 10000 ppr
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	800 mW
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type*	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	250 kHz up to 6000 ppr 500 kHz from 7200 ppr
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA certificate	E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

RL SERIES RESOLUTIONS

10 - 20 - 50 - 100 - 150 - 200 - 250 - 300 - **360** - 400 - 500 - 512 - 600 - 720 - 1000 - 1024 - 1200 - 1440 - **2000** - **2048** - 2500

RM SERIES RESOLUTIONS

1 - 2 - 4 - 5 - 10 - 15 - 16 - 20 - 25 - 30 - 32 - 40 - 50 - 60 - 70 - 80 - 90 - 100 - 120 - 128 - 150 - 200 - 240 - 250 - 256 - 300 - **360** - 400 - 480 - **500** - **512** - **600** - 625 - **720** - 750 - 800 - 900 - **1000** - **1024** - 1200 - 1250 - 1440 - 1500 - 1600 - 1800 - **2000** - **2048** - **2500** - 3000 - **3600** - 4000 - 4096 - **5000** - 6000 - **7200** - 8000 - 8192 - 9000 - **10000**

please directly contact our offices for other pulses, preferred resolutions in bold

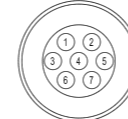
MECHANICAL SPECIFICATIONS

Shaft diameter	∅ 10 mm
Enclosure rating	X = IP 64 (IEC 60529) S = IP 66 (IEC 60529)
Max rotation speed	3000 rpm
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Starting torque (at +20°C / +68°F)	mod. RL / RM IP64 < 0,03 Nm (4,25 Ozin) mod. RL / RM IP66 < 0,06 Nm (8,50 Ozin)
Bearing stage material	EN-AW 2011 aluminum
Housing material	PA66 glass fiber reinforced
Shaft material	1.4305 / AISI 303 stainless steel
Support material	EN-AW 2011 aluminum
Wheel material	EN AB 43100
Bearings	2 ball bearings 2 ball bearings on support (mod. RM)
Bearings life	10 ⁹ revolutions
Operating temperature	-10° ... +70°C (+14° ... +158°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Encoder + support weight	1000 g (35,27 oz)
Wheel weight	mod. A/B 900 g (31,75 oz) mod. C with rubber belt 850g (30 oz)

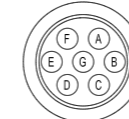
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero	5 pin M12 C / P	8 pin M12 L / RS	12 pin H	5 pin C C / P	8 pin C L / RS
+V DC	red	red	6	4	F	D	4 - 5	D - E	2	7	12	5	7
0 V	black	black	1	6	A	F	6	F	4	1	10	1	8
Ch. A	green	green	3	1	C	A	1	A	3	6	5	2	1
Ch. A-	/	brown	/	3	/	C	7	G	/	5	6	/	2
Ch. B	yellow	yellow	5	2	E	B	2	B	1	4	8	4	3
Ch. B-	/	orange	/	5	/	E	8	H	/	3	1	/	4
Ch. Z	blue	blue	4	/	D	/	3	C	5	2	3	3	5
Ch. Z-	/	white	/	/	/	/	9	I	/	8	4	/	6
⚡	shield	shield	7	7	G	G	10	J	housing	housing	9	/	/

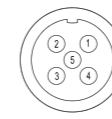
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



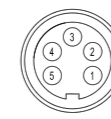
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



M12 connector (5 pin)
M12 A coded
solder side view FV



C connector (5 pin)
IEC 60130-9
solder side view FV



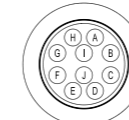
H connector (12 pin) - M23 CCW
Hummel 7.410.000000 -
7.002.912.603
solder side view FV



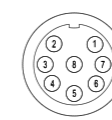
J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



M12 connector (8 pin)
M12 A coded
solder side view FV



C connector (8 pin)
IEC 60130-9
solder side view FV



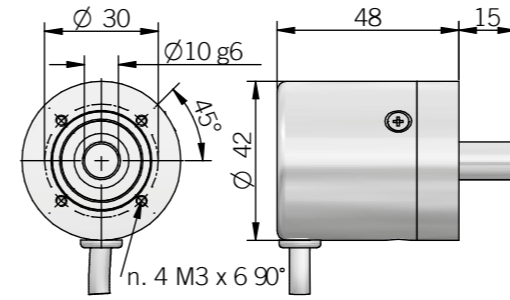
MAIN FEATURES

Encoder with potentiometric output signal.
Rotary potentiometer is fitted in a sturdy housing and it is supported by two ball bearings.
It assures excellent lifetime, speed and high accuracy.

- Singleturn or multiturn models available
- Cable output, connector available on cable end
- Mounting by round flange

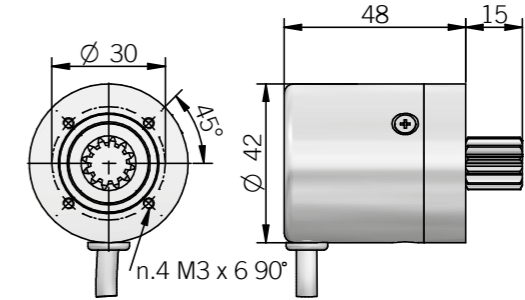


A



dimensions in mm

B



Cogged shaft specifications

$z = 12$
 $m = 1$
 $p = 3,1415$

Formulas

modulus $m = Dp / z$
step $p = m \times \uparrow$
primitive diameter $Dp = m \times z$
cog number $z = Dp / m$

ORDERING CODE

EP	A	103/10	P	R	.XXX
SERIES rotary potentiometer EP					
MODEL fixing flange screw holes Ø 30 mm A fixing flange screw holes Ø 30 mm with cogged shaft B					
RESISTIVE VALUE 1k ohm / 1 turn 102/1 5k ohm / 1 turn 502/1 10k ohm / 1 turn 103/1 5k ohm / 3 turns 502/3 10k ohm / 3 turns 103/3 1k ohm / 10 turns 102/10 5k ohm / 10 turns 502/10 10k ohm / 10 turns 103/10					
OUTPUT TYPE cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5)					
DIRECTION TYPE axial A radial R					
VARIANT custom version XXX					

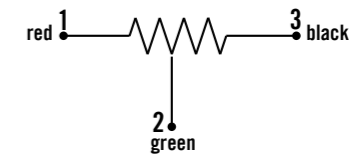
GENERAL SPECIFICATION

Model	Resistive value (Ohm)	Mech. rotation	Electrical rotation	Element technology	Tolerance	Linearity	Minimum resistance (Ohm)	Power rating (70 °C)	Life (shaft revolutions)	Vibration
102/1	1 k	320 ± 5°	same as mech	conductive plastic	±10 %	±1 %	0,2 %	1 W	10'000'000	15 G, 10 ... 150 Hz
102/10	1 k	3600 +10° -0°	same as mech	wirewound	±5 %	±0,25 %	1	2 W	1'000'000	15 G, 10 ... 2000 Hz
502/1	5 k	320 ± 5°	same as mech	conductive plastic	±10 %	±1 %	0,2 %	1 W	10'000'000	15 G, 10 ... 150 Hz
502/3	5 k	1080 +10° -0°	same as mech	wirewound	±5 %	±0,25 %	1	1 W	300'000	15 G, 10 ... 2000 Hz
502/10	5 k	3600 +10° -0°	same as mech	wirewound	±5 %	±0,25 %	1	2 W	1'000'000	15 G, 10 ... 2000 Hz
103/1	10 k	300 ± 5°	270 ± 10°	conductive plastic	±10 %	±5 %	4	1 W	50'000	10 G, 10 ... 150 Hz
103/3	10 k	1080 +10° -0°	same as mech	wirewound	±5 %	±0,25 %	1	1 W	300'000	15 G, 10 ... 2000 Hz
103/10	10 k	3600 +10° -0°	same as mech	wirewound	±5 %	±0,25 %	1	2 W	1'000'000	15 G, 10 ... 2000 Hz

MECHANICAL SPECIFICATIONS

Shaft diameter	mod. EPA Ø 10 mm mod. EPB cogged shaft
Enclosure rating	IP 54 (IEC 60529)
Shock	50 G, 11 ms
Vibration	see table
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel (EP A) steel UNI C45 (EP B)
Housing material	PA 66 glass fiber reinforced
Bearings	2 ball bearings
Limit stop	automatic clutch (no stop)
Operating temperature	0° ... +80°C (+32° ... +176°F)
Storage temperature	-25° ... +85°C (-13° ... +185°F)
RoHS	according to 2011/65/EU directive
UL / CSA certificate	E212495

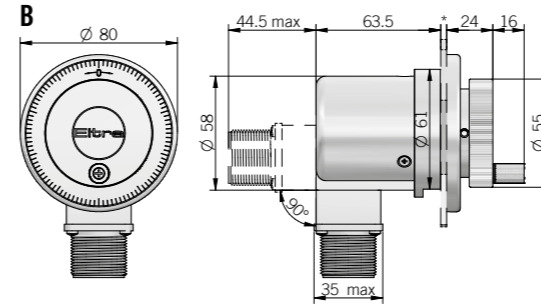
ELECTRICAL CONNECTIONS



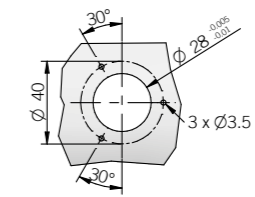
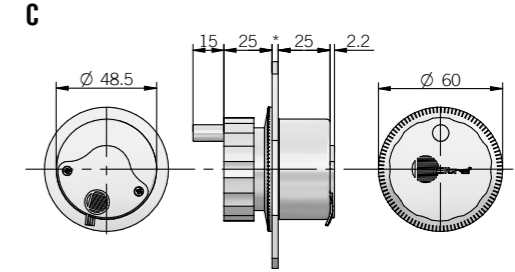
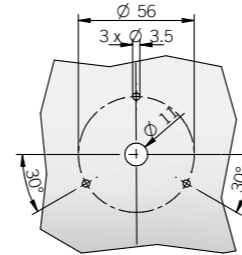
MAIN FEATURES

Electronic handwheel series designed for positioning on CNC machines with manual drive.

- 3 channel encoder (A / B / Z) up to 2500 ppr
- Power supply up to +28 V DC with several electrical interfaces available
- Up to 220 kHz output frequency
- Cable or connector output
- Solid shaft diameter up to 10 mm
- Mounting by fixing flange



Mounting holes requirement



dimensions in mm

ORDERING CODE

EV B *S 100 S 5 L 10 P R .XXX

SERIES	MODEL	RESOLUTION	ZERO PULSE	POWER SUPPLY	ELECTRICAL INTERFACE	SHAFT DIAMETER	OUTPUT TYPE	DIRECTION TYPE	VARIANT
electronic handwheel EV	fixing flange screw holes ϕ 56 mm B fixing flange screw holes ϕ 40 mm C	(mod. B) see table ppr 100 to 2500 (mod. C) ppr 100 see table for pulses availability	without zero pulse S (mod. B) with zero pulse Z	(with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28	NPN open collector C push-pull P line driver L (mod. B) power supply 5/28V - output RS-422 RS	(mod. C) mm 6 (mod. B) mm 10	cable (standard length: mod. B = 1,5 m - mod. C = 0,3 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after DIRECTION TYPE (eg. PR5) (mod. B) MIL connector M (mod. B) JIS-C-5432 connector J female connector included, without female please add 162 as variant code	(mod. B) axial A radial R	custom version XXX

ELECTRICAL SPECIFICATIONS

Resolution	from 100 to 2500 ppr (mod. B) 100 ppr (mod. C)
Power supply	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Current consumption without load	100 mA max
Max load current	C / P = 50 mA / channel L / RS = 20 mA / channel
Output type *	NPN open collector (AEIC-7273, pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272) line driver RS-422 (AELT-5000 or equivalent)
Max output frequency	200 kHz mod. B 150 kHz mod. C
Counting direction	A leads B clockwise (shaft view)
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA certificate	E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

EVB SERIES RESOLUTIONS

100 - 200 - 360 - 500 - 512 - 720 - 1000 - 1024 - 1440 - 2000 - 2048 - 2500

please directly contact our offices for other pulses, preferred resolutions in bold

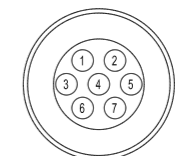
CONNECTIONS

Function	Cable C / P	Cable L / RS	7 pin J C / P	7 pin J L / RS no Zero	7 pin M C / P	7 pin M L / RS no Zero	10 pin J L / RS with Zero	10 pin M L / RS with Zero
+V DC	red	red	6	4	F	D	4 - 5	D - E
0 V	black	black	1	6	A	F	6	F
Ch. A	green	green	3	1	C	A	1	A
Ch. A-	/	brown	/	3	/	C	7	G
Ch. B	yellow	yellow	5	2	E	B	2	B
Ch. B-	/	orange	/	5	/	E	8	H
Ch. Z	blue	blue	4	/	D	/	3	C
Ch. Z-	/	white	/	/	/	/	9	I
⏏	shield	shield	7	7	G	G	10	J

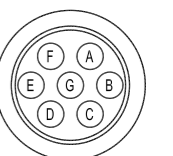
MECHANICAL SPECIFICATIONS

Shaft diameter	ϕ 6 / 10 mm
Enclosure rating	IP 64 (mod. B) (IEC 60529) IP 40 (mod. C) (IEC 60529)
Mechanical indexes per turn	100
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Bearing stage material	EN-AW 2011 aluminum
Shaft material	1.4305 / AISI 303 stainless steel
Housing material	PA 66 glass fiber reinforced (mod. B) nickel plated brass (mod. C)
Bearings	2 ball bearings
Bearings life	10^9 revolutions
Operating temperature	-10° ... +60°C (+14° ... +140°F)
Storage temperature	-25° ... +70°C (-13° ... +158°F)
Weight	450 g (15,87 oz) mod. B 150 g (5,29 oz) mod. C

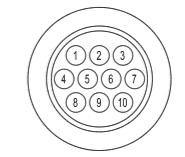
J connector (7 pin)
JIS-C-5432 Size 16
solder side view FV



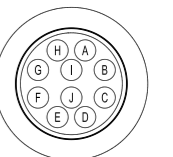
M connector (7 pin)
Amphenol MS3102-E-16-S
solder side view FV



J connector (10 pin)
JIS-C-5432 Size 16
solder side view FV



M connector (10 pin)
Amphenol MS3102-E-18-1
solder side view FV



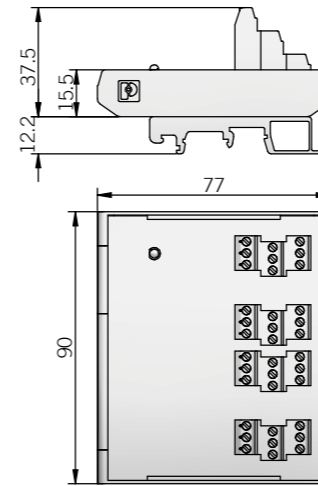
MAIN FEATURES

This board is used when it is necessary to adjust encoder electronic features to control ones.
Main functions of EMB are output signal splitting and adaptation of output stages.
 For instance, it happens to have an encoder with 5 V DC output and a control that accepts only 24 V DC inputs. It may also happen to use an encoder connected with a control with the same power supply, but different electronics.
 It can solve a wide range of problems: check the ordering code to find further informations.
 On the board there can be up to 2 different voltages and it must be supplied through the X4 connector with the higher voltage used. Moreover it is possible to obtain up to 8 outputs from the same input by assembling several boards in a single support in order to reduce wirings drastically.
 In this case the ordering code will contain informations about all outputs.
 For example, a board with one 5 V DC NPN input and eight 5 V DC line driver outputs has the following ordering code: **EMB5N5L5L5L5L5L5L5L**.



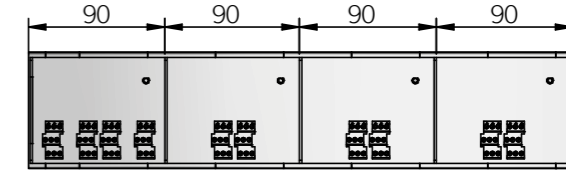
EMB

Single implementation



dimensions in mm

**Multiple implementation
(4 modules / 8 outputs max)**



ORDERING CODE

EMB	*0	5	L	8/24	P	8/24	P	.2V	.XXX
<p>SERIES signal splitter EMB</p> <p>INPUT OPTION * add for optically isolated input 0</p> <p>INPUT VOLTAGE X1 CONNECTOR 5 V DC 5 (mod. EMB) 8 ... 24 V DC 8/24 (mod. EMBO) 24 V DC 24</p> <p>INPUT ELECTRONICS X1 CONNECTOR (mod. EMB) NPN N (mod. EMB) NPN open collector C push-pull P line driver L (mod. EMB) PNP R</p> <p>OUTPUT VOLTAGE (OUT1) X2 CONNECTOR 5 V DC 5 (mod. EMB) 8 ... 24 V DC 8/24 (mod. EMBO) 24 V DC 24</p> <p>OUTPUT ELECTRONICS (OUT1) X2 CONNECTOR (mod. EMB) NPN N (mod. EMB) NPN open collector C push-pull P line driver L</p> <p>OUTPUT VOLTAGE (OUT2) X3 CONNECTOR 5 V DC 5 (mod. EMB) 8 ... 24 V DC 8/24 (mod. EMBO) 24 V DC 24</p> <p>OUTPUT ELECTRONICS (OUT2) X3 CONNECTOR (mod. EMB) NPN N (mod. EMB) NPN open collector C push-pull P line driver L</p> <p>VERSION version 2. .2V</p> <p>VARIANT custom version .XXX</p>									

The following example may explain better a typical EMB application: an encoder with 5 V DC RS-422 output has to be connected to a 24 V DC push-pull input and also to an instrument with 5 V DC RS-422 input. Ordering code will be: **EMB5L8/24P5L** where

EMB5L indicates 5 V DC line driver input on X1 connector
 EMB5L8/24P indicates 24 V DC push-pull output on X2 connector
 EMB5L8/24P5L indicates 5 V DC line driver output on X3 connector

Power supply of this board is 24 V DC, because it is the highest used value, and it will be supplied through X4 connector.

ELECTRICAL SPECIFICATIONS

Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC 24 = 22,8 ... 25,2 V DC
Current consumption without load on X4	70 mA max
Supply current on X1 (for sensor power supply)	100 mA max
Max current consumption	I _{max} = 280 + 960 + 100 = 1340 mA considering: 4 x EMB = 70 x 4 = 280 mA 3 x 8 outputs (40mA each) = 960 mA 1 x input sensor supply current = 100 mA
Output type *	NPN / NPN open collector / push-pull / line driver
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA certificate	E212495

* for further details please see OUTPUT LEVELS under TECHNICAL BASICS section

MECHANICAL SPECIFICATIONS

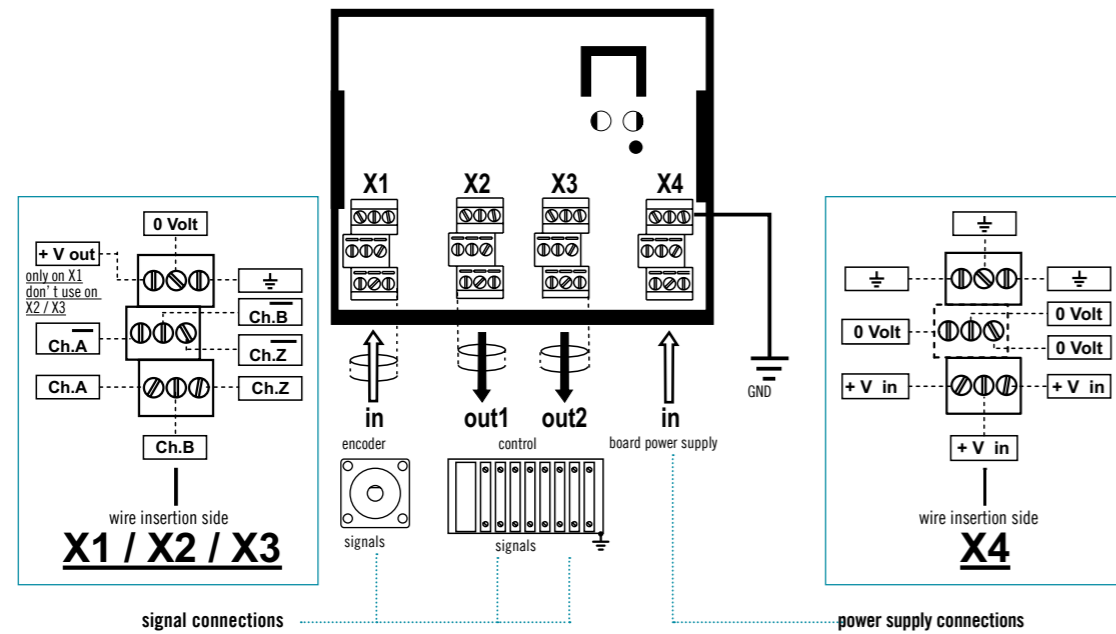
Enclosure rating	IP00	
Operating temperature	-20° ... +85°C (-4° ... +185°F)	
Storage temperature	-20° ... +85°C (-4° ... +185°F)	
Fixing type	DIN 46277-3 rail (Omega)	DIN 46277-2 rail (Omega)
Weight	150 g (5,29 oz) (1 module)	

X1 INPUT ELECTRONIC SPECIFICATIONS

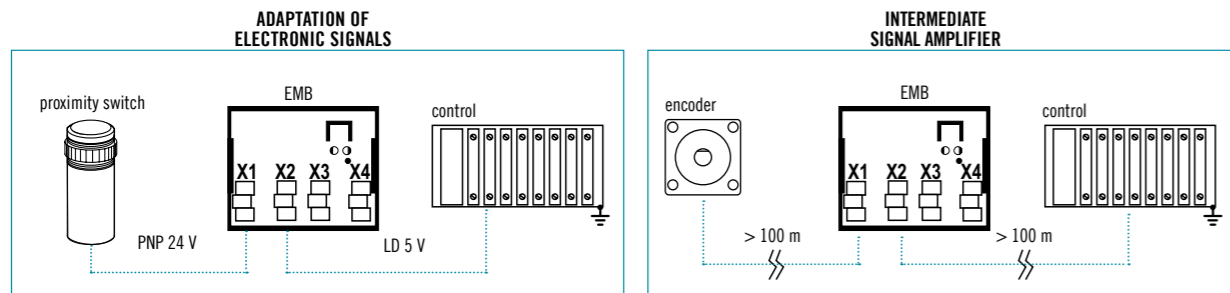
Input type	Max load current (mA per channel)	Max input frequency (kHz)*
5P (TTL compatible)	15	100
5L (RS-422 compatible)	40	200
8/24P (push pull)	20	100
8/24L (line driver HTL)	20	100
8/24N (NPN)	20	10
8/24C (NPN open coll)	20	10
8/24R (PNP)	20	10

* depending on length and cable specs

TERMINAL BOARD CONNECTIONS



APPLICATION EXAMPLES



MAIN FEATURES

This board is used when it is necessary to select a signal among a maximum of 3 inputs. **The EMD board accepts input signals coming from a maximum of 3 encoders and provides as output the signals of one of these encoders.**

Output signals are selected connecting properly the two inputs, in1 and in2, according to the operating diagram (see next page).

EMD and encoder electronics must be indicated in the ordering code and the electrical interfaces of the connected encoders must be all identical. Moreover the EMD provides 3 contacts normally open that close when respective input is selected.

The following example is needful to understand better the use of this board.

We would like to read the signals of 3 encoders (or other devices with similar features) in sequential way. Encoders must have same output electronics, for example 5 V DC line driver. The instrument for data acquisition, on the contrary, has a different electrical interface, for example 24 V DC push-pull. In this case the EMD board will perform the selection function among the connected encoders and the matching of the electrical interfaces.

The ordering code will be:

EMD5L8/24P, where EMD5L indicates that inputs are 5 V DC line driver, EMD5L8/24P indicates that output is 8÷24 V DC push-pull. EMD power supply must be the highest value among requested voltages: in this case 8÷24 V DC. The encoder selection is carried out through a logic type signal at in1 and in2 inputs on the terminal board.

Logic level "1" is obtained connecting a voltage included between 5 and 24 V DC to above mentioned inputs.

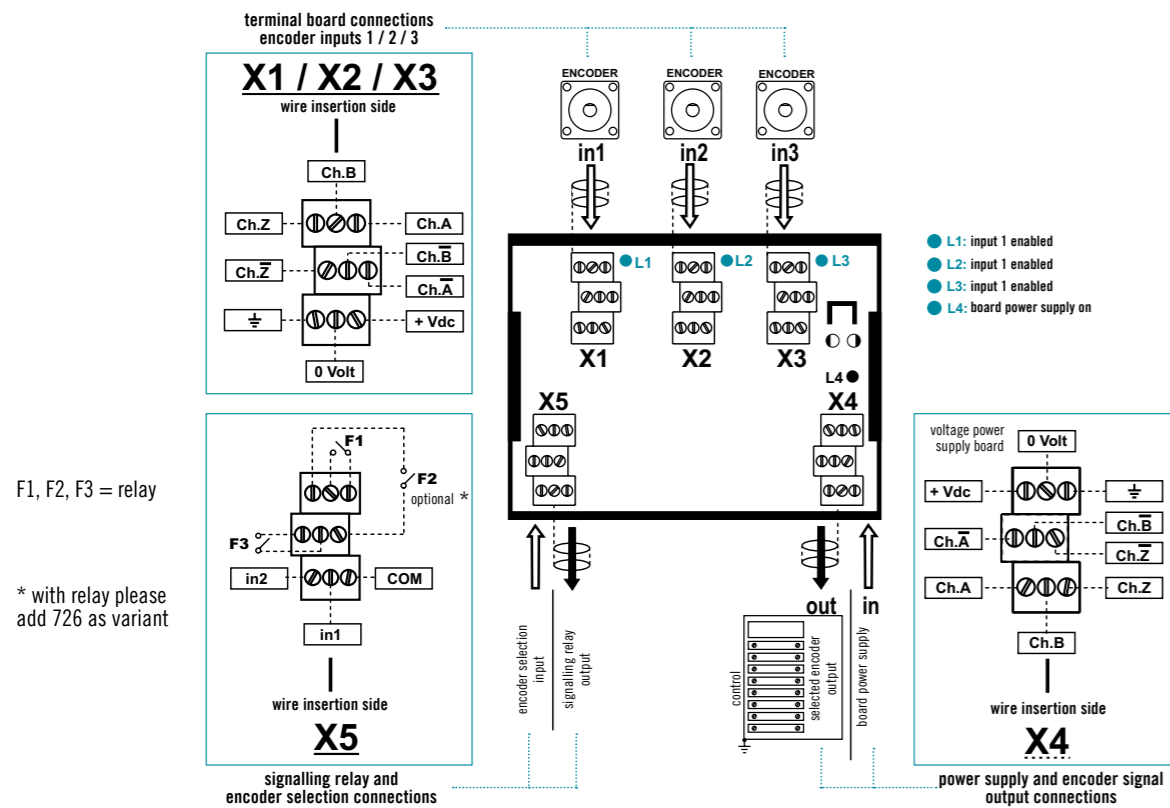
Logic level "0", instead, is correctly interpreted if voltage is included between 0 and 3 V DC. The combination of logic levels at in1 and in2 inputs sets outputs to 4 different states, as described in the table in the following page.



ORDERING CODE

	in	out
EMD	5	L 8/24 P . XXX
SERIES		signal selector EMD
INPUT VOLTAGE X1 / X2 / X3 CONNECTOR		5 V DC 5 8 ... 24 V DC 8/24
INPUT ELECTRONICS X1 / X2 / X3 CONNECTOR		(with voltage 8 ... 24V) push-pull P line driver L
OUTPUT VOLTAGE X4 CONNECTOR		5 V DC 5 8 ... 24 V DC 8/24
OUTPUT ELECTRONICS X4 CONNECTOR		push-pull P line driver L
VARIANT		custom version XXX add 726 as variant for relay model

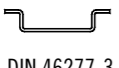
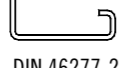
TERMINAL BOARD CONNECTIONS



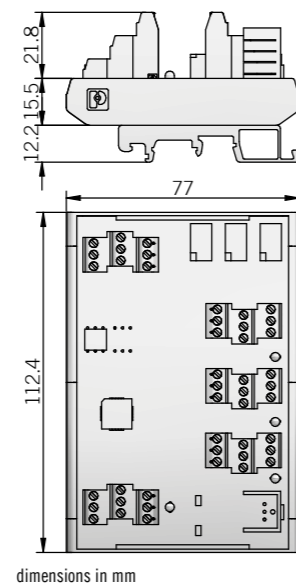
LOGIC STATES

Logic state on X5		Selected encoder on X4			Selected contact on X5 (with variant 726)		
in1	in2	X1	X2	X3	F1	F2	F3
0	0	-	-	-	-	-	-
1	0	•	-	-	•	-	-
0	1	-	•	-	-	•	-
1	1	-	-	•	-	-	•

ELECTRICAL SPECIFICATIONS

Power supply	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC
Current consumption without load	150 mA max
Max load current	20 mA / channel (line driver) 40 mA / channel (push-pull)
Max input current	10 mA for channel
Input logic levels in1 and in2	"1" = 5 ... 24 V DC "0" = 0 ... 3 V DC
Contact characteristics	Vmax = 125 V AC / 60 V DC Imax = 0,5 A Vmin = 5 V DC Imin = 1 mA
Operating temperature	0° ... +40°C (+32° ... +104°F)
Storage temperature	-10° ... +60°C (+14° ... +140°F)
Fixing on panel	 DIN 46277-3 rail (Omega)  DIN 46277-2 rail (Omega)

EMD



dimensions in mm



ACCESSORIES

ACCESSORIES FOR DIFFERENT APPLICATION'S NEEDS.

From connectors to couplings, Eltra offers a comprehensive range of accessories to satisfy generic and specific application requirements.

Perfectly matching the corresponding transducers, these accessories provide the basis for a cost-effective integration within your system.



STANDARD ELASTIC COUPLINGS

Eltra elastic couplings are essential parts for motion transmission to the encoder shaft. Couplings are aluminium alloy made and are composed by a cylindrical body on which there is a helical groove that determines:

- torsional rigidity
- ability to compensate for slight shaft misalignments
- ability to absorb shaft axial play

Elastic coupling can be supplied with different coupling diameters

Ordering code example: G 25 A 8 / 10 means d1 = 8 mm, d2 = 10 mm



STANDARD ELASTIC COUPLINGS ORDERING CODE

Series	Model	Shaft Fixing Type	Hole Diameter d1	Hole Diameter d2
G	25	A	6 / 8	6 / 8
<i>(DO NOT ADD IF d2 = d1)</i>				

SERIES
precision elastic coupling G

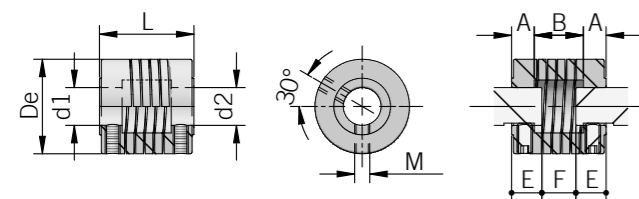
MODEL
20 / 25 / 30
see table for dimensions

SHAFT FIXING TYPE
shaft fixing with grub screw A

HOLE DIAMETER d1
6 mm 6
(mod. G25 / G30) 8 mm 8
(3/8") 9,52 mm 9
10 mm 10

HOLE DIAMETER d2
6 mm 6
(mod. G25 / G30) 8 mm 8
(3/8") 9,52 mm 9
10 mm 10

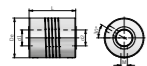
MECHANICAL DIMENSIONS



dimensions in mm

STANDARD COUPLINGS

Type of material: aluminium



For other holes (d1-d2) contact our offices directly

Standard couplings	P / N	De	L	d1 = d2	A	B	M	E	F	Torque
G 20 A 6	94070006	∅ 20	20 ± 0,1	∅ 6H7 +0,012/0	6	8	M3	7	6	0,25 Nm
G 25 A 8	94070026	∅ 25	25 ± 0,1	∅ 8H7 +0,015/0	7	11	M4	8	9	0,4 Nm
G 25 A 9	94070030	∅ 25	25 ± 0,1	∅ 9,52H7 +0,015/0	7	11	M4	8	9	0,4 Nm
G 25 A 10	94070012	∅ 25	25 ± 0,1	∅ 10H7 +0,015/0	7	11	M4	8	9	0,4 Nm
G 30 A 10	94070051	∅ 25	30 ± 0,1	∅ 10H7 +0,015/0	8	14	M4	9	12	0,4 Nm

For proper installation it is recommended to insert shafts in the coupling observing "E" dimensions

SPECIAL APPLICATION COUPLINGS

Special application couplings are designed to meet extreme coupling conditions such as high torque or severe axial or radial play. Please refer to single product description to identify right elastic coupling for your application.

GS-DA SERIES

GS-DA series are double loop plastic coupling with medium torsional stiffness, low restoring forces with impact and vibration damping effect. It allows a smooth running, maintenance-free motion and a reliable compensation of radial, lateral and angular misalignments. It is also thermally and electrically insulated.

GS-EA SERIES

GS-EA series are heavy duty helix coupling for multi-purpose use for backlash-free and angularly aligned transmission of rotary motions with high torsional stiffness with medium restoring forces. It gives vibration-damping effect and optimum compensation of misalignments. It is produced from a single piece and has clamping hubs for shaft connections without causing any surface defects.

GS-EP SERIES

GS-EP series are low-cost shaft couplings manufactured using injection moulding technology with medium torsional stiffness, low restoring forces and vibration damping effect.

Metal inserts in the hubs allows reliable shaft connection and thanks to free slot area the shafts may project into the coupling. It is also electrically insulated.

GS-M SERIES

GS-M series are multi-purpose couplings used for backlash-free transmission of rotary motions with high vibration-damping effect, good compensation of misalignments and low torsional stiffness and low restoring forces. It has no moving parts, very robust design.

GS-O SERIES

GS-O series are elastic couplings where rotation is transmitted through a central disc that slides over the tenons on the hubs under controlled preload conditions to eliminate backlash. These couplings provide generous radial compensation and easy maintenance.

GS-S SERIES

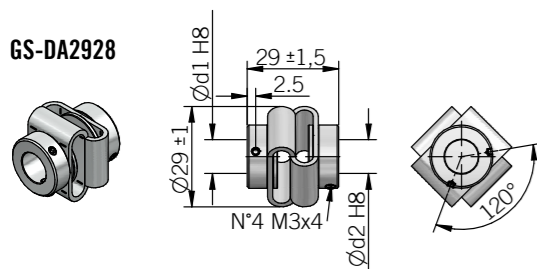
GS-S series are bellows couplings for backlash-free and angularly aligned transmission with high vibration-damping effect, optimum compensation of misalignments with very high torsional stiffness and low restoring forces. Design is very robust due to stainless steel bellows and also has clamping hubs for shaft connections without causing any surface defects.

SPECIAL APPLICATION ELASTIC COUPLINGS ORDERING CODE

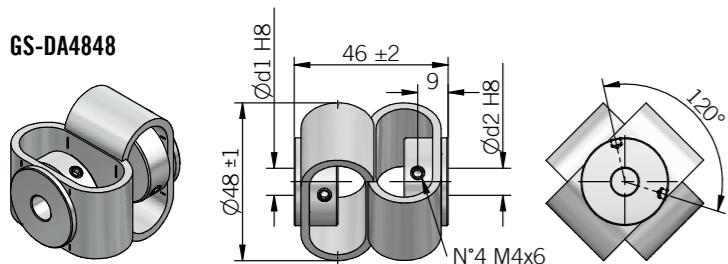
P / N	Code	Description
94070188	GS-DA2928-6 (former GS32A6)	Double loop plastic coupling 29 x 28 mm (∅ 6 / 6 mm hole)
94070050	GS-DA2928-8 (former GS01A8)	Double loop plastic coupling 29 x 28 mm (∅ 8 / 8 mm hole)
94070091	GS-DA2928-10 (former GS11A10)	Double loop plastic coupling 29 x 28 mm (∅ 10 / 10 mm hole)
94070112	GS-DA4848-10 (former GS15A10)	Double loop plastic coupling 48 x 48 mm (∅ 10 / 10 mm hole)
94070219	GS-EA1323-4 (former G13A4)	Aluminium coupling 13 x 23 mm (∅ 4 / 4 mm hole)
94070143	GS-EP1520-6 (former GS21A6)	Plastic coupling with helical groove 15 x 20 mm (∅ 6 / 6 mm hole)
94070149	GS-EP1520-4 (former GS22A4)	Plastic coupling with helical groove 15 x 20 mm (∅ 4 / 4 mm hole)
94070115	GS-M1635-8 (former GS13A8)	Spring coupling 16 x 35 mm (∅ 8 / 8 mm hole)
94070184	GS-M1635-10 (former GS30A10)	Spring coupling 16 x 35 mm (∅ 10 / 10 mm hole)
94070061	GS-O1922-6 (former GS02A6)	Decomposable coupling Oldham 19 x 22 mm (∅ 6 / 6 mm hole)
94070117	GS-O1922-10 (former GS16A10)	Decomposable coupling Oldham 19 x 22 mm (∅ 10 / 10 mm hole)
94070218	GS-O1922-10/12 (former GS41A10/12)	Decomposable coupling Oldham 19 x 22 mm (∅ 10 / 12 mm hole)
94070171	GS-S2530-10 (former GS25A10)	High pulses bellows coupling 25 x 30 mm (∅ 10 / 10 mm hole)

please directly contact our offices for other models

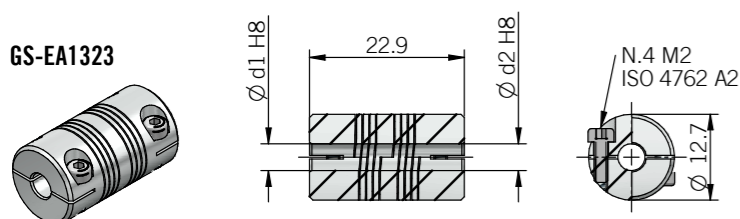
GS-DA2928



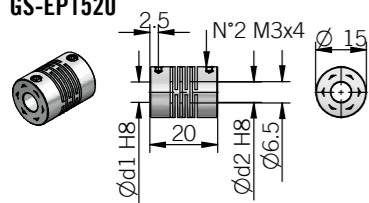
GS-DA4848



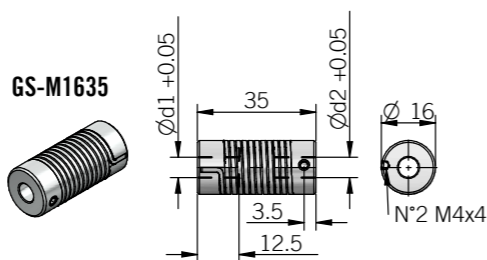
GS-EA1323



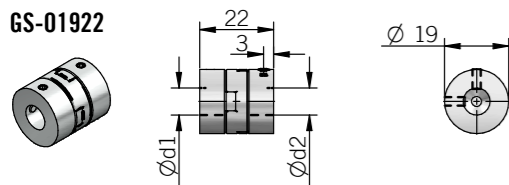
GS-EP1520



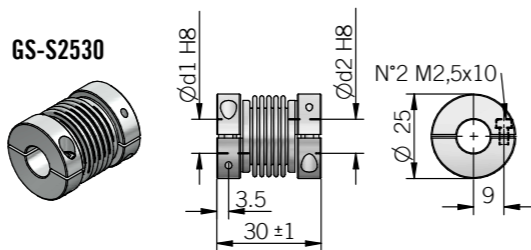
GS-M1635



GS-01922



GS-S2530

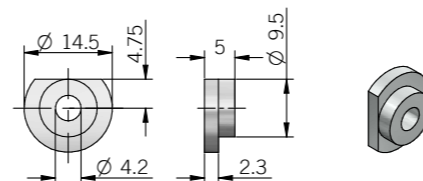


dimensions in mm

TECHNICAL DATA

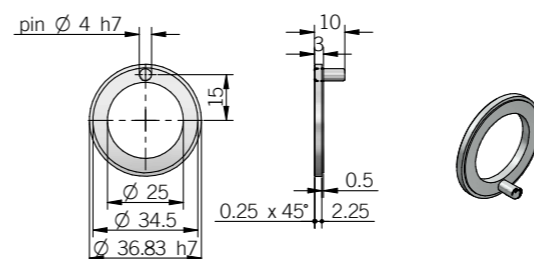
	DA2928	DA4848	EA1323	EP1520	M1635	01922	S2530
Max speed (rpm)	3000	3000	5000	12000	3000	3000	10000
Max torque (Nm)	0,5	2	2	0,3	0,5	1,7	2
Max offset radial (mm)	± 2	± 3	± 0,17	± 0,3	± 1	± 0,2	± 0,3
Max offset axial (mm)	± 2	± 4	± 0,25	± 0,2	± 1	± 0,1	± 0,4
Max offset angular (°)	± 10	± 12	± 5	± 2,5	± 5	± 0,5	± 4
Moment of inertia (gcm ²)	41	106	1,2	2	10	6,7	29,8
Max clamping torque (Nm)	1	1	0,3	0,7	1,5	0,94	1
Temperature range	-30° ... +80°C (-22° ... +176°F)	-30° ... +80°C (-22° ... +176°F)	-40° ... +140°C (-40° ... +284°F)	-10° ... +80°C (14° ... +176°F)	-30° ... +120°C (-22° ... +248°F)	-20° ... +60°C (-4° ... +140°F)	-30° ... +120°C (-22° ... +248°F)
Weight (g) (oz)	33 (1,16)	85 (3,00)	5 (0,18)	6 (0,21)	28 (0,99)	12 (0,42)	20 (0,71)
Flange material	steel galvanized	steel galvanized	aluminium	PA 66 glass fiber reinforced	zinc die casting	aluminium	aluminium
Insert material	poliurethan	poliurethan	aluminium	aluminium	spring steel	acetal	stainless steel

FIXING CLAMPS

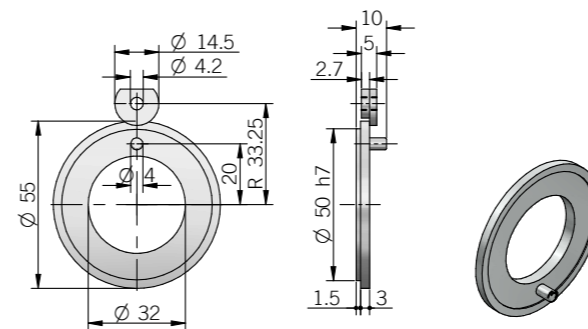


Description	P/N	Material	Scope of delivery	Applicable to model
kit n.3 fixing clamps	94080001	EN-AW 2011 aluminum	n.3 fixing clamps	36K - 40N - 40X - 49C/P - 50A/B - 58B - 63A - 80A - 90A

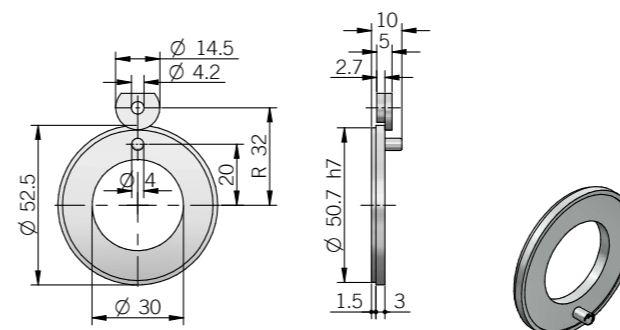
MECHANICAL FLANGES



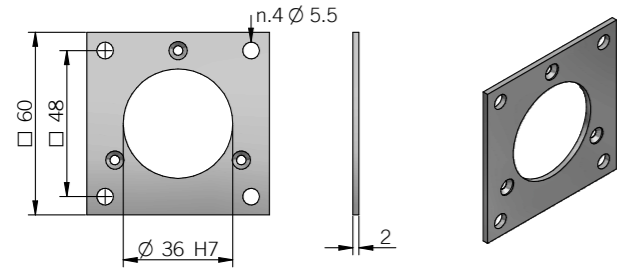
Description	P/N	Material	Scope of delivery	Applicable to model
FLG004 - resolver flange size 15	94010076	EN-AW 2011 aluminum	n.1 flange	36K



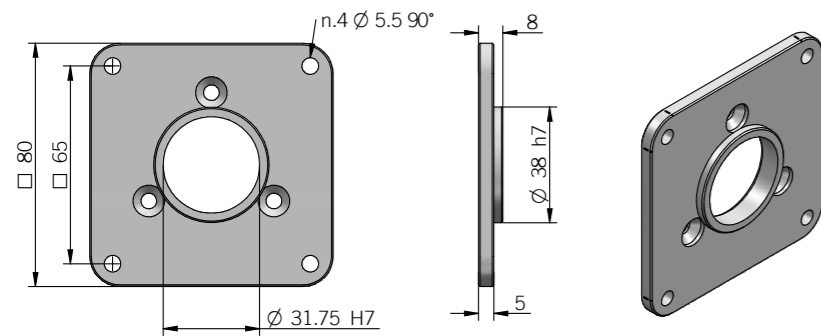
Description	P/N	Material	Scope of delivery	Applicable to model
FLG000 - resolver flange size 19 (01 version)	94010087	EN-AW 2011 aluminum	n.1 flange	49C/P



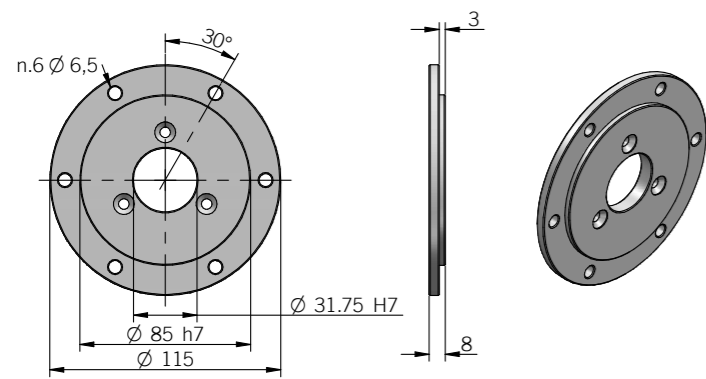
Description	P/N	Material	Scope of delivery	Applicable to model
FLG001 - resolver flange size 19 (14 version)	94010065	EN-AW 2011 aluminum	n.1 flange	49C/P



Description	P/N	Material	Scope of delivery	Applicable to model
58C square flange	94990048	EN-AW 2011 aluminum	n.1 58C square flange n.3 M3x6 screws	58C

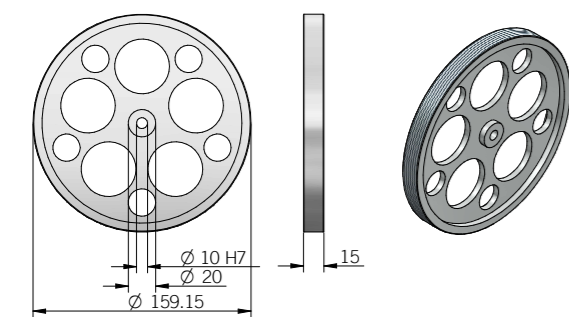


Description	P/N	Material	Scope of delivery	Applicable to model
63A square flange	94990049	EN-AW 2011 aluminum	n.1 63A square flange n.3 M5x10 screws	63A



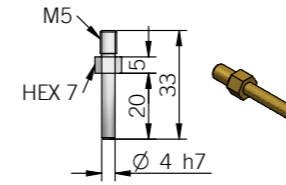
Description	P/N	Material	Scope of delivery	Applicable to model
63A REO-444 flange	94990050	EN-AW 2011 aluminum	n.1 63A REO-444 flange n.3 M5x10 screws	63A

MEASURING WHEELS

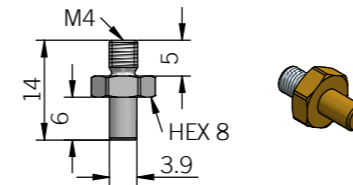


Description	P/N	Material	Scope of delivery	Applicable to model
Measuring wheel weight 260 g (9,17 oz)	44030108	EN-AW 2011 aluminum	n.1 measuring wheel n.1 M5x16 screw	RL - RM 500

TORQUE PINS



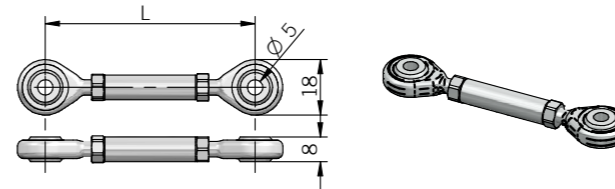
Description	P/N	Material	Scope of delivery	Applicable to model
M5 4mm torque pin	23240008	Brass	n.1 torque pin	EH - EF 80



Description	P/N	Material	Scope of delivery	Applicable to model
M4 3,9 mm torque pin	94080010	Brass	n.2 torque pins	88PE

TORQUE ARM

For applications with low axial and radial play

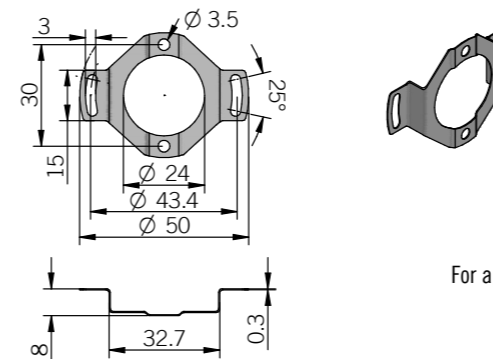


Length

SN5A30	L = 80 ± 10mm
SN5A60	L = 110 ± 10mm
SN5A90	L = 140 ± 10mm

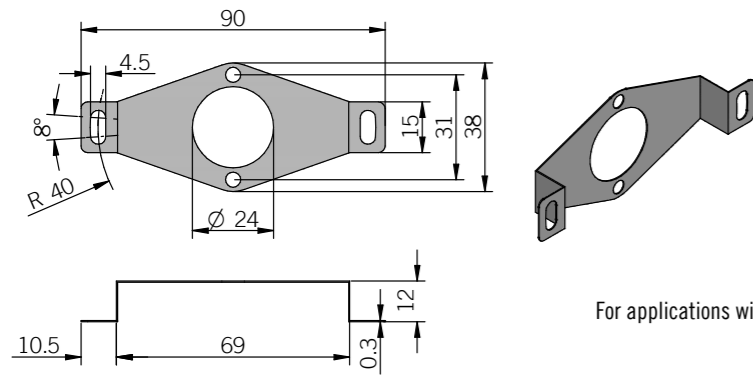
Description	P/N	Material	Scope of delivery	Applicable to model
SN5A30	94010061	Steel	n. 1 torque arm n. 2 M5 x 12 UNI ISO 7380	88PE - 120P
SN5A60	94010070			
SN5A90	94010071			

ENCODER COUPLINGS



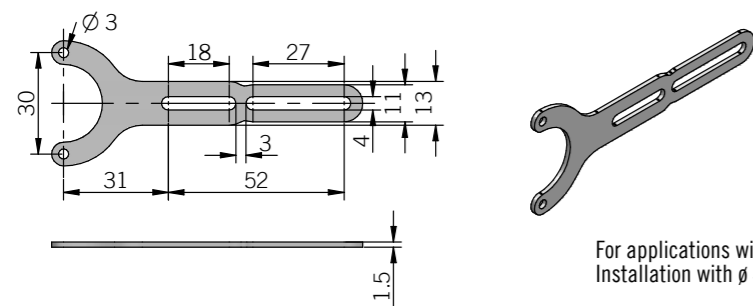
For applications with high dynamics and moderate axial play and low radial play

Description	P/N	Material	Scope of delivery	Applicable to model
∅ 43,4 mm spring coupling	94990046	1.4310 AISI 301	n.1 encoder spring n.2 M3x4 screws	38F



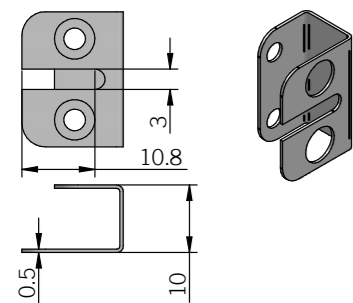
For applications with high dynamics and moderate axial play and low radial play

Description	P/N	Material	Scope of delivery	Applicable to model
ø 80 mm spring coupling	94990047	1.4310 AISI 301	n.1 encoder spring n.2 M3x4 screws	38F



For applications with low dynamics and high axial play and low radial play. Installation with ø 4 mm cylindrical pin. Do not install with rigid fixing (e.g. screw)

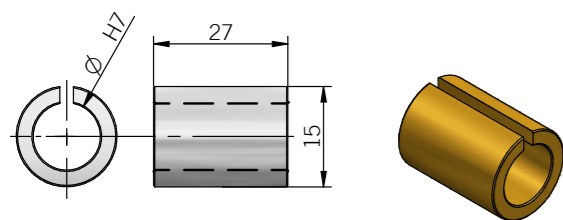
Description	P/N	Material	Scope of delivery	Applicable to model
38F bracket kit	94990045	Stainless steel	n.1 bracket n.2 M3x4 screws	38F



For applications with low dynamics and high axial play and low radial play. Installation with ø 3 mm cylindrical pin. Do not install with rigid fixing.

Description	P/N	Material	Scope of delivery	Applicable to model
88P-88PE torque stop kit	94990051	1.4310 AISI 301	n.1 torque stop n.2 M3x4 screws	88P - 88PE

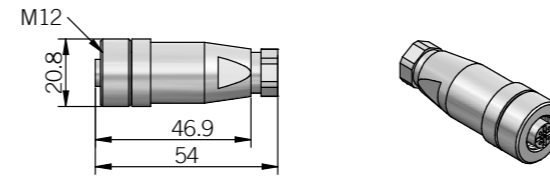
SHAFT ADAPTERS



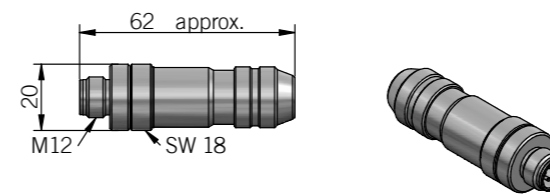
Description	P/N	Material	Scope of delivery	Applicable to model
Shaft adapter 15/12 mm	41890398	Bronze	n.1 shaft adapter	AAM 58F
Shaft adapter 15/10 mm	41890399			

For further shaft adapter diameters please directly contact our offices

CONNECTORS



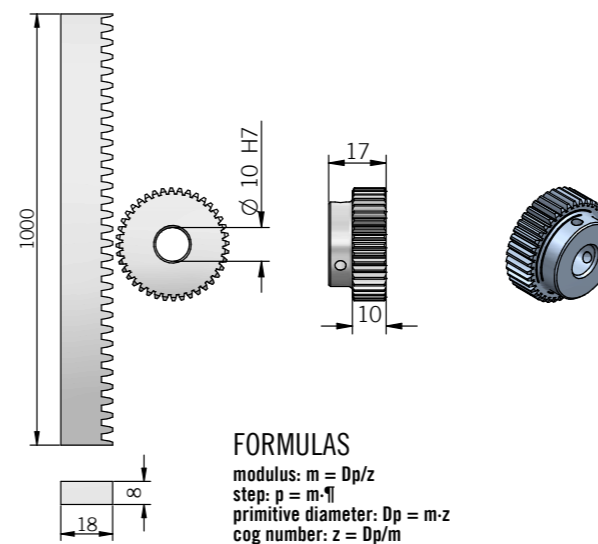
Description	P/N	Material	Scope of delivery	Applicable to model
M12 female connector for power supply (POWER)	22030091	Plastic	n.1 female M12 A coded connector	AAM 58



Description	P/N	Material	Scope of delivery	Applicable to model
M12 male connector for I/O (PORT 1 / 2)	22030152	Metal	n.1 female M12 D coded connector	AAM 58

EC34 ACCESSORIES

Rack and cogged wheel
p = 2,5 z = 40 m = 0,796

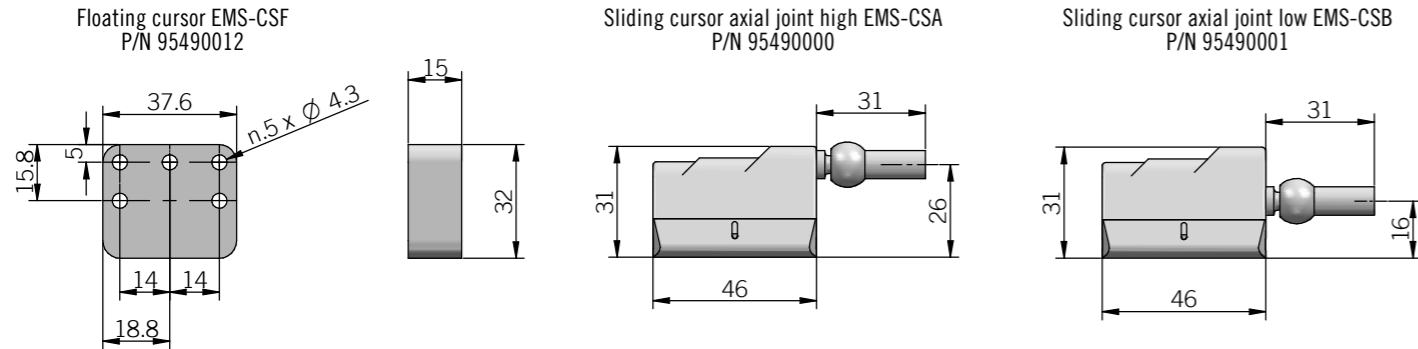


FORMULAS
 modulus: $m = Dp/z$
 step: $p = m \cdot \pi$
 primitive diameter: $Dp = m \cdot z$
 cog number: $z = Dp/m$

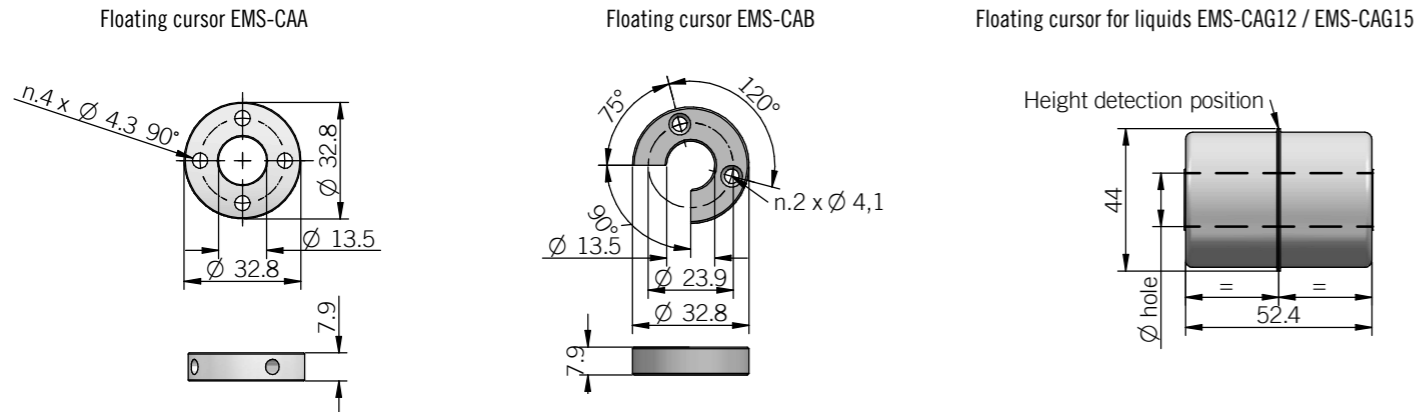
dimensions in mm

Description	P/N	Material	Scope of delivery	Applicable to model
Cogged wheel M = 0,796 / P = 2,5 / Z = 4	94080003	C45 steel	n.1 cogged wheel	34A
Rack P = 2,5 / 1m length	23280006		n.1 1m P 2,5 rack	

CURSORS FOR EMSPA - EMSPB - EMSPS

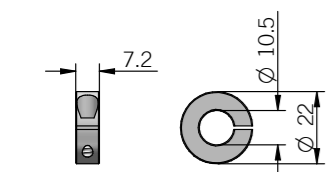


FLOATING CURSORS FOR EMSSA - EMSSS



Description	P/N	Material	Scope of delivery
EMS-CAA	95590000	aluminum	n.4 M4 brass nuts n.8 D4 brass washers n.4 M4x25 brass screws
EMS-CAB	95590001	aluminum	n.4 M4 brass nuts n.4 D4 brass washers n.2 M4x25 brass screws
EMS-CAC	95590011	aluminum	/
EMS-CAG12	95590012	AISI 316 stainless steel	12 mm hole
EMS-CAG15	95590013	AISI 316 stainless steel	15 mm hole

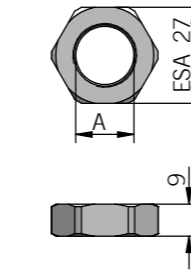
COLLAR CLAMPING FOR EMS-CAG12 / EMS-CAG15



Description	P/N	Material	Scope of delivery
EMS-FG01	95590014	AISI 316 stainless steel	n.1 D3 AISI 316 washer n.1 M3x8 AISI 316 screw

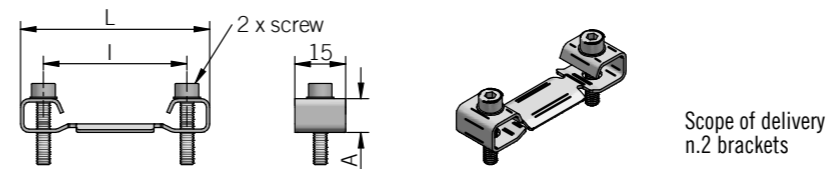
dimensions in mm

HEX NUT



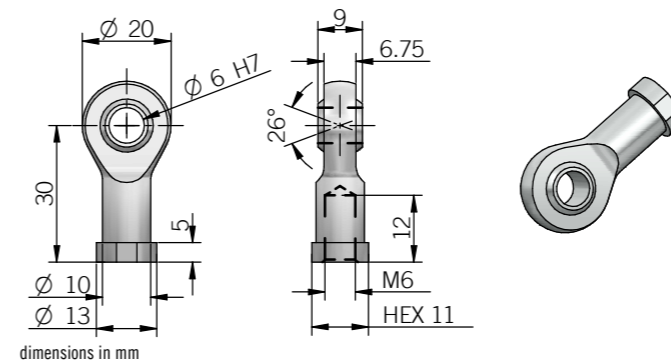
Description	P/N	Material	A	Applicable to model
EMS-CD01	95590010	AISI 316 stainless steel	M18 x 1,5	EMSSA - EMSSS
EMS-CD02	95590015	AISI 316 stainless steel	3/4" - 16UNF	EMSSA - EMSSS

BRACKETS



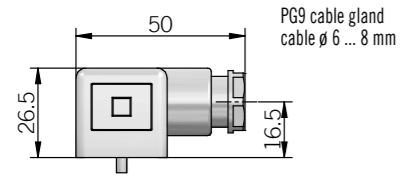
Description	P/N	Center-to-center (I)	Overall dimension (L)	Height (A)	Screw (M)	Applicable to model
EMSPA-EMSPS-ST42	95490011	42,5	56	12,4	M4	EMSPA - EMSPS
EMSPA-EMSPS-ST50	95490010	50	63,5	12,4	M5	EMSPA - EMSPS
EMSPB-ST42	95490022	42,5	56	10	M4	EMSPB
EMSPB-ST50	95490026	50	63,5	10	M5	EMSPB

EPLA BALL JOINT

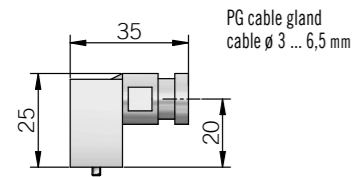


Description	P/N	Material	Scope of delivery	Applicable to model
EPLA-SN01	95390003	Steel	n.1 ø 6 mm ball joint	EPLA

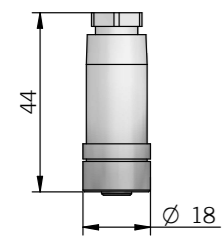
CONNECTORS



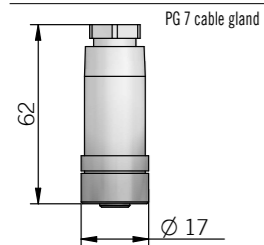
Description	P/N	Material	Scope of delivery	Applicable to model
EPLA/C-EMSPB C04FV 90°(IP 65)	95390004	Plastic	n.1 female DIN 43650-A (4 pin) connector	EPLA - EPLC - EMSPB



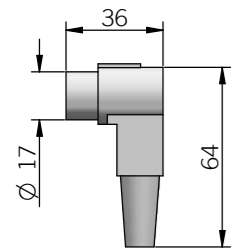
Description	P/N	Material	Scope of delivery	Applicable to model
EPLB-C04FV 90° (IP 65)	95390001	Plastic	n.1 female 43650-C (4 pin) connector	EPLB



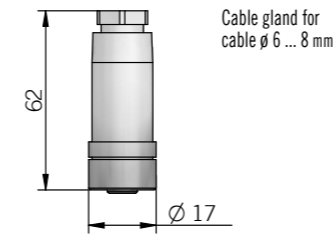
Description	P/N	Material	Scope of delivery	Applicable to model
EPL-C03FV (IP 40)	95390002	Plastic	n.1 female C03FV (3 pin) connector	EPLA - EPLB



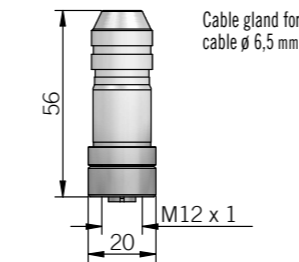
Description	P/N	Material	Scope of delivery	Applicable to model
EPL-C05FV (IP 67)	95390005	Metal	n.1 female DIN 43322 (5 pin) connector	EPLA - EPLB - EPLC - EPLT



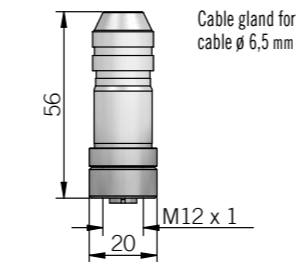
Description	P/N	Material	Scope of delivery	Applicable to model
EPL-C05FV 90° (IP 40)	95390007	Plastic	n.1 female DIN 43322 (5 pin) connector	EPLA - EPLB - EPLC - EPLT



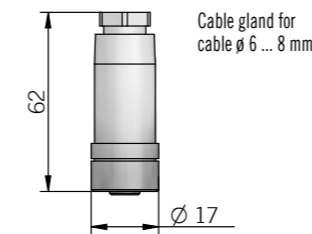
Description	P/N	Material	Scope of delivery	Applicable to model
EMS-C08FV (IP 67)	95490025	Metal	n.1 female M16 DIN 45326 (8 pin) connector	EMSPA - EMSPS



Description	P/N	Material	Scope of delivery	Applicable to model
EMS-S05FV (IP 67)	95490002	Metal	n.1 female M12 A coded (5 pin) connector	EMSPA - EMSPB



Description	P/N	Material	Scope of delivery	Applicable to model
EMS-S08FV (IP 67)	95490024	Metal	n.1 female M12 A coded (8 pin) connector	EMSPA - EMSPB



Description	P/N	Material	Scope of delivery	Applicable to model
EMS-C06FV (IP 67)	95490015	Metal	n.1 female M16 DIN 45322 (6 pin) connector	EMSPA - EMSPS - EMSSA - EMSSS



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